NATIONAL INDUSTRIAL SAND ASSOCIATION

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November 18, 1998

C. W. Jameson, Ph.D.
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Dear Dr. Jameson:

In reviewing the Report on Carcinogens (RoC) Background Document on Silica, I was struck by the underestimation of production data for silica-containing materials.

The tonnage data from the IARC Monograph you have used of 25.8 million tons for 1990, and 27.9 million for 1994 is for industrial sand and gravel only. This amount is dwarfed by the actual tonnage of silica bearing materials used in the U.S. annually. For example, for construction uses alone 1.3 billion metric tons of crushed stone, and 914 million metric tons of sand and gravel are used annually. Enclosed are the latest U.S. Geological Survey Reports for these two commodities. Because construction aggregates all contain crystalline silica as a major component, these types of uses should be included in the RoC production data. Additionally, mostly all nonmetallic minerals will contain some percentage of quartz as an accessory mineral which has the potential to be released as dust during manufacturing and processing.

The subcommittee of the Board of Scientific Counselors and readers of the RoC need an appreciation of the actual tonnage of silica-bearing material that is consumed annually in the U. S. I recommend that you contact Dr. Aldo Barsotti at the USGS for accurate data to reflect the enormity of the production, use and potential exposure of this important material to our society.

I look forward to providing comments to the subcommittee at the upcoming meeting.

Sincerely yours,

Robert E. Glenn, CIH
President

/blg
Enclosures

U.S. Department of the Interior • U.S. Geological Survey

MINERAL INDUSTRY SURVEYS

CONSTRUCTION SAND AND GRAVEL

Thomas J. Casadewell, Acting Director Reston, VA 20192

Annual Review 1996

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Construction sand and gravel is one of the most accessible natural resources and a major basic raw material used mostly by the construction industry. Despite the low value of its basic products, the construction sand and gravel industry is a major contributor to and an indicator of the economic well-being of the Nation.

A total of 914 million metric tons of construction sand and gravel was produced in the United States in 1996; this was a slight increase compared with that of 1995. After a decrease in production in 1991, sand and gravel production increased for the following 5 consecutive years, an indication of the continuous strong demand for construction aggregates in the United States. *(See table 1.)*

Sand and gravel production increased during 1996 owing to continued growth in construction activity. Total construction activity advanced by 6% to $324.5 billion. This follows a 3% increase in 1995 and represents the fifth straight year of moderate increases for the construction industry (Rock Products, 1997). The construction industry is by far the largest consumer of sand and gravel.

The U. S. Geological Survey (USGS) surveyed 7,233 construction sand and gravel operations in the United States. Of these, 5,562 were active, 1,489 were idle, and 182 were either reported as or assumed to be permanently shut down. Of the 7,233 operations surveyed in 1996, 3,988, or 55.1%, responded to the USGS. The 3,988 respondents contributed 78% of the 914 million tons produced in 1996. The 5,562 operations were run by 3,838 companies with 8,109 active sand and gravel pits.

Foreign trade of construction sand and gravel remained minor in 1996. Exports increased nearly 18% to 1.5 million tons, but the value decreased by about 6% to $23.3 million, compared with those of 1995.

Imports increased about 13% to 1.26 million tons, and the value increased almost 32% to $15.8 million. Because imports and exports are small, domestic apparent consumption[1] of construction sand and gravel is essentially equal to U.S. production of 914 million tons.

Legislation

The Department of Transportation and Related Agencies Appropriation Act of 1997 (Public Law 104-205) was signed by the President on October 1, 1996. The Act appropriated a record highway funding of $20.3 billion, an increase of $313 million over that of fiscal year 1996. The Act also appropriated $1.46 billion for the Airport Improvement Program, an increase of $10 million over that of fiscal year 1996.

On December 13, 1996, the International Agency for Research on Cancer (IARC) upgraded crystalline silica inhaled in the form of quartz or cristobalite from occupational sources from Group 2A (probably carcinogenic to humans) to Group 1 (carcinogenic to humans). The IARC working group voted 10 to 7 in favor of the change. The group concluded that on the basis on a large number of epidemiological studies, evidence was sufficient in humans for the carcinogenicity of inhaled crystalline silica. The Occupational Safety and Health Administration (OSHA) and the Mine Safety and Health Administration use IARC reports to determine whether a substance should be covered by the Hazard Communication Standard. Products containing quartz or cristobalite will have to include a Material Safety Data Sheet stating the new Group 1 classification (Engineering and Mining Journal, 1997).

Other major issues of concern to the construction sand and gravel industry are the implementation of the Clean Air Act Amendments of 1990 and its complex legal and technical provisions; the amended Federal Water Pollution Control Act of 1977; the Clean Water Act, Section 404, dealing with "wetlands" and the associated "no net loss of wetlands" policy; the Storm Water Pollution Prevention Program; and the provisions of the Federal Endangered Species Act.

Production

U.S. production of construction sand and gravel was 914 million tons in 1996. Of the four major geographic regions, the West again led the Nation in the production of construction sand and gravel with 327 million tons, or 36% of

[1] Apparent consumption is defined as production for consumption (sold or used) plus total imports minus total exports.

the U.S. total. It was followed by the Midwest with 289 million tons, or 32%, the South with 202 million tons, or 22%; and the Northeast with 97 million tons, or 11%. Compared with that of 1995, production increased in all the major geographic regions except the Midwest, where production was virtually unchanged. *(See table 2.)*

Of the nine geographic divisions, the East North Central led the Nation in the production of construction sand and gravel with 192 million tons, or 21% of the U.S. total. It was followed by the Pacific with 169 million tons, or 18.4%, and the Mountain with 158 million tons, or 17.3%. *(See table 2 and figure 1.)* Compared with that of 1995, production increased in the following divisions: the New England, 7.1%; the East South Central, 5.9%; and the Pacific, 3%. The divisions with decreases were the Middle Atlantic, 3.4%, and the West South Central, the West North Central, and the South Atlantic, slight. Production in the East North Central and the Mountain regions were unchanged from 1995.

A review of the production by size of operation indicates that 40.5% of the construction sand and gravel produced in 1996 came from 1,788 operations reporting between 100,000 and 499,999 tons per year, 25% came from 371 operations reporting between 500,000 and 999,999 tons per year, and 23.3% came from 151 operations reporting more than 1,000,000 tons per year. A total of 5,562 operations were active. At least 3.2%, or 182, of the operations active in 1995 where idled or shut down during 1996. *(See table 8.)*

The estimated production by quarters for 1996 indicates that most of the construction sand and gravel in the United States was produced in the third quarter and was followed by the second and the fourth quarters. *(See table 3.)* Estimated production by each quarter was also available for the majority of the States. *(See table 5.)*

Construction sand and gravel was produced in 1996 in every State. The 10 leading States were, in descending order of tonnage, California, Texas, Michigan, Ohio, Arizona, Washington, Illinois, Wisconsin, Minnesota, and Colorado. Their combined production represented 52% of the national total. Compared with that of 1995, production increased in 18 States, decreased in 14, and stayed about the same in 18. Of the top 10 States, production were virtually unchanged in 5, increased in 3, decreased in 2. *(See table 4.)*

In New Jersey, Amboy Aggregates Inc., South Amboy, has applied to the Minerals Management Service (MMS) for permission to mine sand in an area 3 to 45 nautical miles off the New Jersey coast. The application was made because of the shortage of available sand in the densely populated State. Some environmental groups and fisheries have responded negatively to the application. The MMS was set to begin the decisionmaking process in October after the comment period was closed (Engineering News Record, 1996d).

Limited information about the production of construction sand and gravel in foreign countries may be found in the USGS "Minerals Yearbook, Volume III, Area Reports: International." For nonreporting countries, estimates of sand and gravel and crushed stone outputs can be based on such indirect sources as the level of cement consumption.

In an industry with thousands of operating companies, status and ownership changes are many. Although it is not possible to review them all, a few noteworthy events follow.

Mineral Barexor began production of gold and construction sand and gravel at its Crescent Valley Gold Placer Mine in north-central Nevada. A wash plant, separator, and gold concentrator are expected to process 1,000 cubic yards per 10-hr shift of sand and gravel (Rock Products, 1996d).

Rogers Group has purchased the assets of Robinson Block Co. and Martinsville Sand and Gravel. Robinson Block's operations are in Bedford, IN, and Martinsville Sand and Gravel is in Morgan County, IN (Rock Products, 1996g).

Luck Stone, a producer of crushed stone, entered the sand and gravel business by acquiring Mechanicsville Sand and Gravel Co. from Powhatan Ready-Mix. Renamed Luck Sand and Gravel, the company expects to double production at the operation northeast of Richmond, VA (Rock Products, 1996e).

Denver-based Western Mobile purchased the ready-mix, concrete, sand, and gravel operations of Gosney and Sons Ready Mix Division of Bayfield, CO. Western Mobile's parent company, Redland Aggregates Ltd., Groby, Leicester, England, also plans to acquire additional aggregate operations in the United States (Rock Products, 1996k).

Bardon Group, United Kingdom, expanded its presence in the U.S. aggregates industry with the acquisition of E.L. Gardner's three ready-mix concrete plants and about 9 million tons of sand and gravel reserves in eastern Maryland (Rock Products, 1996b).

Irish-based CRH added to its holdings in the Northeastern United States by acquiring Tilcon from the British conglomerate BTR. Tilcon has 60 operations in Connecticut, Delaware, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont (Rock Products, 1996f).

Titan Resources announced it has acquired a commercial quarry located in southeastern Houston, TX. The new quarry marks Titan's entry into the commercial sand and gravel industry (Rock Products, 1996j).

Texas Industries added to its sand and gravel holdings by purchasing T.L. James and Co.'s Honey Island operation. Near Slidell, LA, the operation produces sand, gravel, clay, soil conditioners, and golf course materials (Rock Products, 1996i).

CAMAS Inc., the U.S. subsidiary of the British-based construction materials group, CAMAS plc, purchased Model Stone Co. Model Stone, based in Minneapolis/St. Paul, MN, has high-quality sand and gravel reserves and operations, a concrete block plant, and four ready-mix plants (Pit and Quarry, 1996).

Consumption

Construction sand and gravel reported by producers to the USGS is actually material that was "sold or used" by the companies and is defined as such. Stockpiled production is

not reported until it is sold to a user or consumed by the producer. Because no consumption surveys are conducted by the USGS, the "sold or used" tonnage is assumed to represent the amount produced for domestic consumption and export. Because some of the construction sand and gravel producers did not report a breakdown by end use, their total production is reported under "Unspecified uses, actual." The estimated production of nonrespondents is reported under "Unspecified uses, estimated."

Of the 914 million tons of construction sand and gravel produced in 1996, 377 million tons, or 41.2% of the total, was unspecified uses. Of the remaining 537 million tons, 43.2% was used as concrete aggregates; 23.4%, for road base and coverings and road stabilization; 13.2%, as asphaltic concrete aggregates and other bituminous mixtures; 11.9%, as construction fill; 1.8%, for concrete products, such as blocks, bricks, pipes, etc.; 1.4%, for plaster and gunite sands; and the remainder, for snow and ice control, railroad ballast, roofing granules, filtration, and other miscellaneous uses. *(See table 6.)*

To provide a more-accurate estimation of the consumption patterns for construction sand and gravel, the "Unspecified uses" are not included in the aforementioned percentages. It is recommended that in any marketing or use pattern analysis, the quantities included in "Unspecified uses" be distributed among the reported uses by applying the previous percentages.

A review of consumption by major geographic regions indicates that most of the sand and gravel for concrete aggregates, including concrete sand, was used in the West, 36.4%; the South, 28.9%; and the Midwest, 25.5%; these regions have high levels of construction activity. Of the sand and gravel used for road base and coverings and for asphaltic concrete aggregates and other bituminous mixtures, 45.3% and 46.1%, respectively, were consumed in the West and 35.8% and 28.4%, respectively, in the Midwest. *(See table 7.)*

Additional information regarding production and/or consumption of construction sand and gravel by major uses in each State and the State districts is published in the USGS "Minerals Yearbook, Volume II, Area Reports: Domestic."

Recycling

The aggregates industry has been involved with recycling for several decades. Recently, recycling has become more important to aggregate producers, and the number of aggregate companies that are recycling has been increasing. Recycling in this industry generally refers to the crushing, screening, and reuse of cement and asphalt concretes. Aggregate and related asphalt and ready-mix companies are often involved at construction projects where they collect and reuse the materials at the site. Others collect materials from construction companies that haul the material to the recycler. The annual survey of construction sand and gravel producers now collects information on recycling of cement and asphalt concrete by sand and gravel companies. No information on recycling of these materials by the construction or demolition companies is collected by the USGS.

Asphalt Concrete.—A total of 3.74 million tons of asphalt concrete valued at $14.3 million was recycled by 160 companies in 37 States. This volume represents a 6.6% increase compared with that of 1995. *(See tables 14 and 15.)* Leading States were, in descending order of tonnage recycled, California, Washington, North Carolina, and Minnesota. Leading companies were, in order of volume produced, J.A. Jones Co., Granite Construction Co., CSR America, Inc., Lehman Brothers Co., and Aman Brothers, Inc.

Cement Concrete.—A total of 4.03 million tons of cement concrete valued at $15.1 million was recycled by 142 companies in 29 States. This volume represents a 12% increase compared with that of 1995. *(See tables 14 and 16.)* Leading States were, in descending order of tonnage recycled, Minnesota, California, and New York. Leading companies were, in order of volume produced, Premier Aggregates, Inc., Aman Brothers, Inc., Broad Hollow Estates, Inc., Danner, Inc., and CSR America, Inc.

Transportation

Information regarding the method of transportation of construction sand and gravel from the pit or processing plant to the first point of sale or use is available for each geographic region, as well as for the total United States. *(See table 11.)* Reports regarding the method of transportation were provided by the producers for 512 million tons, or 56% of the total U.S. production of construction sand and gravel. Of this total, 78% was transported by truck; 3.4%, by waterway; and 1.8%, by rail. A significant amount of construction sand and gravel produced, about 16.1%, was not transported, but was used at the production site. Because most producers did not either keep records or report shipping distances or cost per ton per mile, no transportation cost data were available.

Prices

Prices in this chapter are f.o.b. plant, usually at the first point of sale or captive use. This value does not include transportation from the plant or yard to the consumer. It does, however, include all costs of mining, processing, in-plant transportation, overhead costs, and profit.

Compared with that of 1995, the 1996 average unit price increased nearly 2.1% to $4.38 per ton. By use, the unit prices varied from a high of $5.77 for roofing granules to a low of $2.91 for fill. The largest increases were recorded for road stabilization (lime), 40.1%; road stabilization (concrete), 9.3%; and fill, 7.8%. Average unit prices declined for roofing granules, 21.2%; railroad ballast, 8%; and concrete products, 5.1%. *(See table 6.)*

Foreign Trade

The widespread distribution of domestic sand and gravel deposits and the high cost of transportation limits foreign trade mostly to local transactions across international boundaries. U.S. imports and exports are small, representing less than 1% of the domestic consumption.

Exports of construction sand increased by 37% to 1.16 million tons compared with that of 1995, but the value decreased by 5.5% to $18.1 million. Mexico was the major destination, receiving about 58% of the total, and was followed by Canada with 22%. Exports of construction gravel declined 19% to 368,000 tons, and the value decreased 7% to $5.16 million. Canada was the major destination, receiving about 85% of the total. *(See table 12.)*

Imports increased by about 13% to 1.26 million tons, and the value increased by about 32% to $15.8 million. Canada was the major source of imported construction sand and gravel with 76.5% of the total, and was followed by The Bahamas with 12.6%. *(See table 13.)*

Current Research and Technologies

The market for sand for winter road maintenance is being challenged by a new specially processed lightweight aggregate product developed and marketed by Western Aggregates near Denver, CO. The expanded shale product, called Realite Plus, is saturated with calcium or magnesium chloride and then coated with an asphaltic resin. The product is said to decrease significantly the amount of dust generated in spring cleanup and, owing to its weight, reduces transportation cost (Rock Products, 1996h).

A trial run for a new driverless highway is slated for 1997. The goal of the project is to show that off-the-shelf computers and sensors can be used to take highway driving out of the hands of motorists. The demonstration on a California freeway represents the second phase of a 7-year, $210 million program that aims to put a prototype automated highway into operation by 2010 (Engineering News Record, 1996b).

The U.S. Army Corps of Engineers (USACE) and the Federal Aviation Administration (FAA) are each developing new machines to simulate years of wear on highway and runway surfaces in just weeks or months. The testing allows researchers to try new asphalt, concrete, and various other mixes that are being considered for road and runway paving. Known generally as mobile automated loading machines, the machines can run for 24 hours a day, 7 days a week. Both agencies will spend millions of dollars designing, building, and operating the new machines and test facilities. The FAA and the California Department of Transportation are each already using mobile automated loading machines (Engineering News Record, 1996c).

Outlook

The demand for construction sand and gravel in 1997 is expected to be about 940 million tons, or about 2.8% more than that of 1996. The projected increases will be influenced by construction activity primarily in the public construction sector. Compared with that of fiscal year 1996, Federal spending for construction related programs were slated to increase in fiscal year 1997. Increases include USACE, 34%; transit, 8.8%; highways, 1.7%; airport grants, 1%; and Department of Energy cleanup, 1% (Engineering News Record, 1996e). The construction industry is expected to continue to grow in 1997 but at a slower rate. The rate of growth was predicted to drop to 3.5% in 1997 compared with 6% in 1996 (Engineering News Record, 1996f). Another forecaster predicted continued growth in sand and gravel production through 1999, with production reaching 1.04 billion tons in 1999 (Rock Products, 1996a).

The Great Basin Unified Air Pollution Control District in Bishop, CA, is likely to be a large consumer of gravel if plans for Owens Lake are approved. The lake dried as a result of water diversion to Los Angeles, and now the lake bed is adding to air-quality problems in California. The plans call for 14 square miles to be planted with vegetation, 13 square miles to be irrigated, and 8 square miles to be covered with about 37 million tons of gravel (Engineering News Record, 1997).

Construction sand and gravel f.o.b. prices are expected to increase only marginally, owing to a decrease in demand growth compared with the past several years. The delivered prices of construction sand and gravel are, however, expected to increase, especially in and near metropolitan areas, mainly because more aggregates are transported from distant sources. One estimate predicted that aggregate production and price would each increase by 2.7%. The report also estimated that prices will increase by 2.1% in 1998 and 2.5% in 1999 (Engineering News Record, 1996a).

For 1997, the industry is expected to continue to consolidate. Resistance to mining at the local level will push production to more rural areas and increase transportation cost. Acquisition cost will escalate because of the difficulty of starting a greenfield operation, which will allow resourceholders to demand higher prices for already permitted operations (Rock Products, 1996c).

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TABLE 1
SALIENT CONSTRUCTION SAND AND GRAVEL STATISTICS 1/

		1992	1993	1994	1995	1996
Sold or used by producers:						
Quantity 2/	thousand metric tons	834,000 3/	869,000 e/ 3/	891,000	907,000 r/	914,000 3/
Value 2/	thousands	$3,340,000 3/	$3,530,000 e/ 3/	$3,740,000	$3,900,000 r/	$4,000,000 3/
Exports	value, thousands	$18,000	$15,600	$20,300	$24,700	$23,300
Imports	do.	$15,500	$15,400	$14,800	$12,000	$15,800

e/ Estimated. r/ Revised.
1/ Data are rounded to three significant digits.
2/ Puerto Rico excluded from all sand and gravel statistics.
3/ Excludes Hawaii.

TABLE 2
CONSTRUCTION SAND AND GRAVEL SOLD OR USED BY
PRODUCERS IN THE UNITED STATES, BY GEOGRAPHIC DIVISION 1/

	1995				1996			
Region/Division	Quantity (thousand metric tons	Percentage of total	Value (thousands	Percentage of total	Quantity (thousand metric tons	Percentage of total	Value (thousands	Percentage of total
Northeast:								
New England	37,800	4.2	$199,000	5.1	40,500	4.4	$202,000	5.0
Middle Atlantic	58,400	6.4	308,000	7.9	56,400	6.2	301,000	7.5
Midwest:								
East North Central	192,000	21.2	717,000	18.4	192,000	21.0	761,000	19.0
West North Central	97,000	10.7	315,000	8.1	96,500	10.5	324,000	8.1
South:								
South Atlantic	68,000	7.5	292,000	7.5	67,400	7.4	295,000	7.4
East South Central	40,400	4.5	171,000	4.4	42,800	4.7	182,000	4.5
West South Central	91,800	10.1	394,000 r/	10.1	91,700	10.0	402,000	10.0
West:								
Mountain	158,000 r/	17.4	681,000 r/	17.5	158,000	17.3	670,000	16.7
Pacific	164,000 r/	18.0	820,000 r/	21.0	169,000 2/	18.4	867,000 2/	21.7
Total	907,000 r/	100	3,900,000 r/	100	914,000	100	4,000,000	100

r/ Revised.
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Excludes Hawaii.

TABLE 3
SAND AND GRAVEL SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY QUARTER AND DIVISION 1/

Region/Division	Quantity 1st qtr. (thousand metric tons)	Percentage change 2/	Quantity 2d qtr. (thousand metric tons)	Percentage change 2/	Quantity 3d qtr. (thousand metric tons)	Percentage change 2/	Quantity 4th qtr. (thousand metric tons)	Percentage change 2/	Total 3/ (thousand metric tons)	Value Total 3/ (thousands)
Northeast:										
New England	4,800	4.8	11,400	7.4	14,500	9.1	10,700	15.7	41,400	232,000
Middle Atlantic	6,900	-10.7	15,900	-12.6	19,200	-2.7	14,700	14.5	56,600	305,000
Midwest:										
East North Central	18,300	-9.7	53,900	-1.2	71,300	7.8	54,200	6.2	198,000	745,000
West North Central	11,200	4.5	31,200	25.4	40,600	7.3	24,900	6.0	108,000	347,000
South:										
South Atlantic	14,400	-0.6	19,800	5.9	20,100	13.0	17,800	5.1	72,100	313,000
East South Central	7,700	7.0	12,900	18.8	13,100	4.5	10,500	6.0	44,100	185,000
West South Central	22,900	19.3	27,600	17.9	24,800	-1.6	22,500	-6.1	97,800	432,000
West:										
Mountain	33,300	3.3	44,300	8.4	44,300	3.0	39,800	-2.0	162,000	710,000
Pacific 4/	29,800	13.6	45,700	11.5	52,100	12.8	41,700	2.0	169,000	862,000
Total 3/	149,300	4.7	262,700	8.1	300,000	6.5	236,800	3.5	963,000 5/	4,190,000 5/

1/ As published in the "Crushed Stone and Sand and Gravel in the Fourth Quarter of 1996" Mineral Industry Survey.
2/ All percentage changes are calculated by using unrounded totals; percentage changes are based on the corresponding quarter of the previous year.
3/ Data may not add to toals shown because of independent rounding, and differences between projected totals by States and regions.
4/ Does not include Alaska and Hawaii.
5/ Includes Alaska.

TABLE 4
CONSTRUCTION SAND AND GRAVEL SOLD OR USED BY
PRODUCERS IN THE UNITED STATES, BY STATE 1/

State	1995 Quantity (thousand metric tons)	1995 Value (thousands)	1995 Unit value	1996 Quantity (thousand metric tons)	1996 Value (thousands)	1996 Unit value
Alabama	12,000 r/	$49,700 r/	$4.16 r/	13,800	$60,600	$4.40
Alaska 2/	8,920 r/	33,800 r/	3.80 r/	9,380	35,900	3.83
Arizona	40,100	201,000	5.00	41,900	199,000	4.75
Arkansas	11,600	48,300	4.18	11,000	43,500	3.97
California	98,400	542,000	5.51	103,000	583,000	5.65
Colorado	35,000 r/	144,000 r/	4.11 r/	31,600	133,000	4.19
Connecticut	6,410	37,500	5.85	6,380	26,900	4.21
Delaware	2,680	8,740	3.26	2,370	6,820	2.88
Florida	19,300	69,300	3.58	18,500	68,800	3.72
Georgia	5,780	23,100	4.00	6,520	24,500	3.75
Hawaii	405	4,030	9.95	W	W	W
Idaho	13,200	43,500	3.30	14,700	46,100	3.14
Illinois	36,100	147,000	4.07	34,600	144,000	4.17
Indiana	24,900	93,900	3.78	24,800	100,000	4.03
Iowa	14,300	57,000	4.00	13,300	54,600	4.11
Kansas	11,100	29,400	2.65	11,500	31,300	2.72
Kentucky	8,710	31,700	3.63	7,310	25,600	3.50
Louisiana	11,300	50,200	4.43	11,500	53,200	4.62
Maine	6,420	26,900	4.18	6,440	27,500	4.27
Maryland	9,700	61,700	6.36	9,700	61,400	6.33
Massachusetts	11,700	67,500	5.76	14,200	82,500	5.79
Michigan	53,500	178,000	3.34	53,800	197,000	3.66
Minnesota	31,900	99,400	3.11	31,800	107,000	3.36
Mississippi	11,800	53,000	4.51	13,400	60,600	4.54
Missouri	8,840	32,400	3.66	9,820	35,600	3.62
Montana	8,870	34,900	3.93	9,260	35,800	3.87
Nebraska	13,700	47,100	3.43	12,900	44,300	3.44
Nevada	22,500	110,000	4.87	22,400	113,000	5.02
New Hampshire	7,190	34,300	4.77	7,620	36,500	4.79
New Jersey	14,000	80,300	5.74	13,200	70,400	5.33
New Mexico	10,400	50,700	4.88	9,880	48,500	4.91
New York	27,300	134,000	4.92	28,100	145,000	5.17
North Carolina	10,100	50,100	4.96	10,000	50,500	5.03
North Dakota	8,420	23,900	2.83	8,320	23,800	2.86
Ohio	45,300	196,000	4.33	46,600	215,000	4.60
Oklahoma	7,800	25,100	3.22	7,910	27,700	3.50
Oregon	18,200	85,000	4.66	18,300	86,800	4.75
Pennsylvania	17,100	93,100	5.44	15,100	85,600	5.68
Rhode Island	2,790	21,500	7.71	1,990	13,300	6.68
South Carolina	8,880	29,000	3.27	8,780	29,000	3.31
South Dakota	8,730	26,200	3.00	8,750	27,700	3.16
Tennessee	8,020	36,700	4.58	8,380	35,300	4.21
Texas	61,100	271,000	4.43	61,300	278,000	4.53
Utah	23,800	80,200	3.38	24,700	80,500	3.26
Vermont	3,220	11,000	3.43	3,870	15,200	3.93
Virginia	9,710	42,300	4.36	9,780	45,800	4.68
Washington	37,700	155,000	4.10	37,900	162,000	4.27
West Virginia	1,800	7,650	4.25	1,730	7,710	4.44
Wisconsin	32,200	102,000	3.16	32,600	105,000	3.23
Wyoming	3,860	17,500	4.55	3,420	14,700	4.28
Total	907,000 r/	3,900,000 r/	4.30 r/	914,000	4,000,000	4.38

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Data derived, in part, from Alaska Division of Geological and Geophysical Surveys information.

TABLE 5
SAND AND GRAVEL SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY QUARTER AND STATE 1/

State	Quantity 1st qtr. (thousand metric tons)	Percentage change 2/	Quantity 2d qtr. (thousand metric tons)	Percentage change 2/	Quantity 3d qtr. (thousand metric tons)	Percentage change 2/	Quantity 4th qtr. (thousand metric tons)	Percentage change 2/	Total 3/ (thousand metric tons)	Value total 3/ (thousands)
Alabama	3,100	28.3	4,000	31.8	3,800	15.7	3,400	10.6	14,400	60,500
Alaska 4/	–	–	–	–	–	–	–	–	13,900	50,000
Arizona	9,800	6.8	11,100	4.4	10,400	2.8	9,700	-4.0	41,100	207,000
Arkansas	2,500	9.0	2,900	2.4	2,900	-14.8	2,400	-20.4	10,700	45,100
California	18,900	18.6	29,500	11.8	33,000	14.0	27,100	-0.3	108,000	602,000
Colorado	5,400	8.7	10,600	31.8	11,500	-0.5	8,600	-9.7	36,100	150,000
Connecticut	800	-19.9	2,200	13.3	2,600	25.9	1,800	25.6	7,380	43,600
Delaware	500	-20.0	1,100	52.1	1,100	82.9	900	34.6	3,660	12,100
Florida	4,800	(5/)	5,400	8.8	5,100	9.2	4,900	1.1	20,200	72,800
Georgia	1,400	7.2	1,900	18.5	1,800	14.7	1,600	18.0	6,630	26,900
Hawaii 4/	–	–	–	–	–	–	–	–	400	4,000
Idaho	1,400	-10.1	3,600	-28.3	4,500	21.8	5,100	73.7	14,600	48,900
Illinois	3,300	-12.7	10,500	-2.5	12,300	1.3	9,900	4.6	36,000	147,000
Indiana	2,900	-12.7	7,400	8.2	9,700	14.1	6,500	1.9	26,400	100,000
Iowa	1,100	-9.7	4,500	14.9	6,400	12.9	2,800	-17.3	14,900	60,400
Kansas	2,000	60.5	5,500	73.2	4,200	0.4	3,200	30.9	15,000	40,400
Kentucky	1,000	8.4	2,000	-13.9	2,200	-37.3	1,800	-8.5	7,010	25,700
Louisiana	2,800	8.9	3,300	0.2	2,900	0.7	2,800	6.6	11,700	52,200
Maine	700	20.2	2,000	-5.4	2,600	27.0	1,600	-10.1	6,790	28,500
Maryland	1,700	2.1	2,600	-9.7	3,300	18.9	2,600	10.2	10,200	65,400
Massachusetts	2,200	73.3	3,900	10.2	4,900	11.0	4,100	63.2	15,000	87,200
Michigan	4,200	-3.2	13,900	-11.1	21,200	13.4	15,400	3.6	54,700	186,000
Minnesota	3,600	9.9	8,400	-0.4	12,500	1.9	8,600	7.7	33,000	104,000
Mississippi	2,200	0.3	3,800	22.4	4,000	11.8	3,000	3.1	13,000	59,300
Missouri	1,400	-3.2	3,100	91.6	3,600	10.6	2,500	-0.3	10,600	39,200
Montana 6/	–	–	–	–	–	–	–	–	8,210	32,800
Nebraska	900	-32.4	3,800	0.2	6,300	10.5	3,400	13.7	14,300	49,300
Nevada	5,500	6.9	5,400	-7.6	4,900	-12.9	5,200	-10.2	21,100	103,000
New Hampshire	600	-39.7	1,600	-4.6	2,300	-10.6	1,700	-15.4	6,130	29,400
New Jersey	1,700	-34.5	3,900	-8.2	3,200	-20.5	4,000	25.5	12,700	73,900
New Mexico	2,600	9.5	2,900	1.7	2,800	3.9	2,700	8.2	11,000	53,800
New York	3,300	3.9	8,300	-5.7	10,800	14.6	7,300	24.1	29,700	147,000
North Carolina	2,000	-3.4	2,800	9.7	2,900	29.5	2,700	-18.0	10,300	51,600
North Dakota 6/	–	–	–	–	–	–	–	–	8,500	24,200
Ohio	4,700	-10.6	12,700	3.8	16,400	3.2	13,400	11.6	47,100	205,000
Oklahoma	1,700	10.6	2,400	24.5	2,100	-10.2	1,900	-3.1	8,140	26,400
Oregon	2,800	-3.2	4,600	4.3	6,300	-4.9	5,300	24.4	19,000	89,300
Pennsylvania	1,900	-2.4	4,200	-21.3	5,600	-9.3	3,700	-0.2	15,300	84,400
Rhode Island 6/	–	–	–	–	–	–	–	–	3,000	23,300
South Carolina	2,100	8.3	2,900	5.1	2,700	8.5	2,300	31.6	9,950	32,800
South Dakota	500	-34.1	2,600	6.5	4,500	20.5	2,000	8.7	9,530	29,100
Tennessee	1,000	-24.8	2,700	16.1	2,900	14.3	2,100	14.7	8,680	39,900
Texas	16,600	28.5	19,700	30.4	17,300	4.8	15,700	-5.2	69,300	308,000
Utah	3,200	-39.8	8,700	76.7	10,600	55.4	7,800	13.7	30,200	103,000
Vermont	600	52.4	1,700	125.4	2,000	57.0	1,500	82.6	5,770	19,900
Virginia	1,900	-4.9	2,900	5.0	2,900	8.4	2,600	10.2	10,200	44,900
Washington	8,000	2.7	11,200	12.4	13,000	15.7	9,100	4.7	41,300	171,000
West Virginia	200	-10.2	500	-8.5	500	-10.1	400	-15.9	1,600	6,890
Wisconsin	3,200	-10.0	9,500	2.9	11,600	5.1	9,300	9.9	33,500	107,000
Wyoming	500	-45.0	900	-24.0	500	-45.4	600	-35.4	2,450	11,300
Total	XX	XX	XX	XX	XX	XX	XX	XX	963,000	4,190,000

XX Not applicable.
1/As published in the "Crushed Stone and Sand and Gravel in the Fourth Quarter of 1996" Mineral Industry Survey.
2/All percentage changes are calculated by using unrounded totals; percentage changes are based on the corresponding quarter of the previous year.
3/Data may not add to toals shown because of independent rounding and differences between projected totals by States and regions.
4/ State not included in quarterly survey.
5/Less than 1/2 unit.
6/ Owing to a low number of reporting companies, no production estimates by quarters were generated.

TABLE 6
CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN THE UNITED STATES IN 1996, BY MAJOR USE 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Concrete aggregates (including concrete sand)	232,000	$1,130,000	$4.89
Plaster and gunite sands	7,450	39,600	5.31
Concrete products (blocks, bricks, pipe, decorative, etc.)	9,770	51,200	5.23
Asphaltic concrete aggregates and other bituminous mixtures	70,800	353,000	4.98
Road base and coverings	119,000	463,000	3.88
Road stabilization:			
cement	4,700	16,700	3.54
lime	1,760	9,480	5.37
Fill	63,900	186,000	2.91
Snow and ice control	6,800	27,700	4.07
Railroad ballast	974	4,800	4.93
Roofing granules	515	2,970	5.77
Filtration	1,120	6,230	5.54
Other miscellaneous uses	18,000	97,600	5.41
Unspecified: 2/			
Actual	174,000	776,000	4.46
Estimated	203,000	836,000	4.12
Total	914,000	4,000,000	4.38

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 7
CONSTRUCTION SAND AND GRAVEL SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY GEOGRAPHIC DIVISION AND MAJOR USE 1/

(Thousand metric tons and thousand dollars)

	Concrete aggregates (including concrete sand)		Plaster and gunite sands		Concrete products (blocks, bricks, pipe decorative, etc.)		Asphaltic concrete aggregates and other bituminous mixtures		Road base and coverings 2/	
Region/Division	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Northeast:										
New England	6,250	$37,700	105	1,010	140	$930	2,280	$13,800	5,890	$26,600
Middle Atlantic	15,200	96,300	515	3,480	715	5,180	6,910	35,200	7,740	36,100
Midwest:										
East North Central	39,800	162,000	671	2,960	3,050	14,900	13,300	55,800	24,300	95,300
West North Central	19,400	80,000	384	1,940	648	4,100	6,850	25,400	20,800	51,800
South:										
South Atlantic	22,400	96,500	1,440	5,370	2,190	9,290	2,220	9,120	2,510	13,900
East South Central	9,950	43,900	329	2,460	620	3,730	3,540	15,900	3,480	12,300
West South Central	34,800	169,000	292	1,670	477	1,350	3,130	16,000	4,170	14,500
West:										
Mountain	32,600	164,000	1,690	7,150	1,090	5,200	15,400	77,400	35,600	135,000
Pacific	51,800	285,000	2,030	13,500	848	6,460	17,200	104,000	21,400	103,000
Total	232,000	1,130,000	7,450	39,600	9,770	51,200	70,800	353,000	126,000	489,000

	Fill		Snow and ice control		Railroad ballast		Other uses		Total	
Region/Division	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Northeast:										
New England	4,110	$13,900	2,430	$9,030	181	$994	19,200	$97,900	40,500	$202,000
Middle Atlantic	4,260	12,400	1,820	7,840	35	217	19,200	105,000	56,400	301,000
Midwest:										
East North Central	15,700	54,200	1,110	3,780	44	278	94,400	371,000	192,000	761,000
West North Central	5,050	10,100	571	2,010	316	819	42,400	148,000	96,500	324,000
South:										
South Atlantic	7,110	19,600	81	409	123	882	29,400	140,000	67,400	295,000
East South Central	951	3,090	W	W	W	W	23,900	101,000	42,800	182,000
West South Central	6,360	13,200	W	W	W	W	42,500	186,000	91,700	402,000
West:										
Mountain	10,200	26,000	447	2,880	61	306	60,800	252,000	158,000	670,000
Pacific	10,200	33,800	294	1,480	211	1,300	64,600	318,000	169,000	867,000
Total	63,900	186,000	6,800	27,700	974	4,800	396,000	1,720,000	914,000	4,000,000

W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes road and other stabilization (cement and lime).

TABLE 8
CONSTRUCTION SAND AND GRAVEL PRODUCTION IN THE UNITED STATES IN 1996,
BY REGION AND SIZE OF OPERATION 1/

Size range (metric tons)	Northeast				Midwest				South			
	Number of operations	Percentage of total	Quantity (thousand metric tons)	Percentage of total	Number of operations	Percentage of total	Quantity (thousand metric tons)	Percentage of total	Number of operations	Percentage of total	Quantity (thousand metric tons)	Percentage of total
Less than 25,000	378	37.4	3,060	3.2	523	25.7	5,270	1.8	207	20.3	1,880	0.9
25,000 to 49,999	162	16.0	5,220	5.4	310	15.2	10,200	3.5	126	12.4	4,250	2.1
50,000 to 99,999	166	16.4	11,000	11.3	397	19.5	25,900	9.0	175	17.2	11,200	5.5
100,000 to 199,999	140	13.8	17,800	18.4	319	15.7	41,000	14.2	177	17.4	22,900	11.3
200,000 to 299,999	87	8.6	19,100	19.7	180	8.8	39,300	13.6	106	10.4	23,300	11.6
300,000 to 399,999	28	2.8	8,860	9.1	94	4.6	29,300	10.2	66	6.5	20,000	9.9
400,000 to 499,999	18	1.8	7,330	7.6	57	2.8	22,900	7.9	34	3.3	14,000	7.0
500,000 to 599,999	9	.9	4,590	4.7	52	2.6	25,700	8.9	34	3.3	17,100	8.4
600,000 to 699,999	8	.8	4,520	4.7	31	1.5	18,100	6.3	23	2.3	13,400	6.6
700,000 to 799,999	4	.4	2,750	2.8	23	1.1	15,600	5.4	14	1.4	9,430	4.7
800,000 to 899,999	2	.2	1,540	1.6	16	.8	12,400	4.3	11	1.1	8,330	4.1
900,000 to 999,999	1	.1	898	.9	5	.2	4,290	1.5	10	1.0	8,590	4.3
1,000,000 to 1,499,999	7	.7	7,360	7.6	16	.8	17,400	6.0	28	2.7	30,500	15.1
1,500,000 to 1,999,999	–	–	–	–	9	.4	13,300	4.6	4	.4	6,290	3.1
2,000,000 to 2,499,999	–	–	–	–	3	.1	5,760	2.0	4	.4	8,030	4.0
2,500,000 to 4,999,999	1	.1	2,900	3.0	1	.0	2,370	.8	1	.1	2,700	1.3
5,000,000 and more	–	–	–	–	–	–	–	–	–	–	–	–
Total	1,011	97	96,900	100	2,036	100	289,000	100	1,020	100	202,000	100

Size range (metric tons)	West				U.S. total			
	Number of operations	Percentage of total	Quantity (thousand metric tons)	Percentage of total	Number of operations	Percentage of total	Quantity (thousand metric tons)	Percentage of total
Less than 25,000	364	24.3	3,460	1.1	1,472	26.5	13,700	1.5
25,000 to 49,999	184	12.3	5,920	1.8	782	14.1	25,600	2.8
50,000 to 99,999	260	17.4	16,900	5.2	998	17.9	64,900	7.1
100,000 to 199,999	230	15.4	29,900	9.2	866	15.6	112,000	12.3
200,000 to 299,999	114	7.6	25,000	7.7	487	8.8	107,000	11.7
300,000 to 399,999	78	5.2	24,400	7.5	266	4.8	82,600	9.0
400,000 to 499,999	60	4.0	24,400	7.5	169	3.0	68,700	7.5
500,000 to 599,999	45	3.0	22,200	6.8	140	2.5	69,600	7.6
600,000 to 699,999	27	1.8	15,700	4.8	89	1.6	51,700	5.7
700,000 to 799,999	26	1.7	17,500	5.4	67	1.2	45,400	5.0
800,000 to 899,999	20	1.3	15,200	4.7	49	.9	37,400	4.1
900,000 to 999,999	10	.7	8,600	2.6	26	.5	22,400	2.5
1,000,000 to 1,499,999	47	3.1	50,900	15.6	98	1.8	106,000	11.6
1,500,000 to 1,999,999	16	1.1	24,600	7.5	29	.5	44,200	4.8
2,000,000 to 2,499,999	7	.5	14,000	4.3	14	.3	27,800	3.0
2,500,000 to 4,999,999	6	.4	20,600	6.3	9	.2	28,600	3.1
5,000,000 and more	1	.1	7,100	2.2	1	.0	7,100	0.8
Total	1,495	98.4	326,000	100	5,562	98	914,000	100

1/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 9
NUMBER OF CONSTRUCTION SAND AND GRAVEL OPERATIONS AND PROCESSING PLANTS IN THE UNITED STATES IN 1996, BY GEOGRAPHIC DIVISION

Region/Division	Mining operations on land				Dredging operations	Total active operations
	Stationary	Portable	Stationary and portable	No plants or unspecified		
Northeast:						
New England	186	156	38	37	1	418
Middle Atlantic	196	255	51	52	39	593
Midwest:						
East North Central	377	373	102	101	91	1,044
West North Central	226	427	42	71	226	996
South:						
South Atlantic	129	49	9	69	124	380
East South Central	116	23	10	14	64	227
West South Central	194	48	15	67	89	413
West:						
Mountain	286	441	100	39	18	884
Pacific 1/	293	179	69	38	32	611
Total	2,003	1,951	436	488	684	5,562

1/ An undetermined number of operations leased from the Bureau of Land Management in Alaska are counted as one operation.
2/ Hawaii excluded from all sand and gravel statistics.

TABLE 10
NUMBER OF CONSTRUCTION SAND AND GRAVEL OPERATIONS AND PROCESSING PLANTS IN THE UNITED STATES IN 1996, BY STATE

State	Mining operations on land				Dredging operations	Total active operations
	Stationary	Portable	Stationary and portable	No plants or unspecified		
Alabama	42	10	1	10	23	86
Alaska 1/	5	6	1	3	2	17
Arizona	54	53	28	2	2	139
Arkansas	34	7	4	7	7	59
California	164	67	40	14	17	302
Colorado	53	104	26	10	11	204
Connecticut	26	17	7	2	1	53
Delaware	1	3	–	2	3	9
Florida	16	4	–	4	35	59
Georgia	10	2	–	1	29	42
Idaho	32	73	4	6	1	116
Illinois	42	36	25	11	33	147
Indiana	58	29	17	7	21	132
Iowa	46	58	5	9	31	149
Kansas	15	33	7	16	47	118
Kentucky	11	1	3	–	8	23
Louisiana	18	4	2	3	38	65
Maine	32	59	3	13	–	107
Maryland	21	3	6	14	3	47
Massachusetts	65	15	9	7	–	96
Michigan	95	131	25	43	13	307
Minnesota	74	153	19	19	1	266
Mississippi	34	4	6	4	23	71
Missouri	33	12	1	1	35	82
Montana	41	60	3	6	–	110
Nebraska	24	21	–	5	112	162
Nevada	22	29	10	9	–	70
New Hampshire	21	21	8	3	–	53
New Jersey	23	3	7	4	14	51
New Mexico	32	40	13	2	–	87
New York	110	227	31	41	9	418
North Carolina	26	20	–	30	25	101
North Dakota	13	61	4	1	–	79
Ohio	108	17	22	29	21	197
Oklahoma	15	7	1	17	26	66
Oregon	46	28	6	4	4	88
Pennsylvania	63	25	13	7	16	124
Rhode Island	11	–	3	–	–	14
South Carolina	21	5	2	9	15	52
South Dakota	21	89	6	20	–	136
Tennessee	29	8	–	–	10	47
Texas	127	30	8	40	18	223
Utah	41	54	11	2	1	109
Vermont	31	44	8	12	–	95
Virginia	20	12	1	9	13	55
Washington	78	78	22	17	9	204
West Virginia	14	–	–	–	1	15
Wisconsin	74	160	13	11	3	261
Wyoming	11	28	5	2	3	49
Total	2,003	1,951	436	488	684	5,562

1/ An undetermined number of operations leased from the Bureau of Land Management in Alaska are counted as one operation.

TABLE 11
CONSTRUCTION SAND AND GRAVEL SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY REGION AND METHOD OF TRANSPORTATION 1/

(Thousand metric tons)

Region/Division	Truck	Rail	Water	Other	Not transported	Not specified	Total
Northeast:							
New England	17,800	578	--	49	3,620	18,500	40,500
Middle Atlantic	28,900	--	1,550	143	5,360	20,400	56,400
Midwest:							
East North Central	78,400	492	3,200	716	15,100	94,500	192,000
West North Central	38,000	402	4,000	1,010	7,610	45,500	96,500
South:							
South Atlantic	32,300	1,350	193	7	3,960	29,600	67,400
East South Central	14,700	7	1,540	56	2,220	24,300	42,800
West South Central	36,800	5,030	2,020	173	6,140	41,500	91,700
West:							
Mountain	79,600	302	--	207	16,600	61,200	158,000
Pacific 2/	73,400	1,270	4,770	812	22,100	66,200	169,000
Total	400,000	9,440	17,300	3,170	82,700	402,000	914,000

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Hawaii excluded from all sand and gravel statistics.

TABLE 12
U.S. EXPORTS OF CONSTRUCTION SAND AND GRAVEL IN 1996,
BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

Country or Territory	Sand		Gravel	
	Quantity	F.a.s. value 2/	Quantity	F.a.s. value 2/
North America:				
Bahamas, The	1	144	(3/)	8
British Virgin Islands	–	–	3	36
Canada	251	3,610	312	1,690
Mexico	678	5,540	18	2,090
Netherlands Antilles	(3/)	28	23	489
Trinidad and Tobago	3	157	–	–
Other 4/	3	433	2	63
Total	933	9,910	358	4,380
South America:				
Argentina	5	1,060	1	181
Ecuador	85	1,270	(3/)	5
Peru	4	490	–	–
Venezuela	41	1,510	–	–
Other 5/	4	729	3	268
Total	138	5,060	4	454
Europe:				
Belgium	6	157	–	–
Germany	5	215	3	91
Spain	1	18	–	–
Sweden	(3/)	120	–	–
United Kingdom	15	78	1	89
Other 6/	3	247	(3/)	7
Total	31	834	3	187
Asia:				
Hong Kong	1	33	(3/)	5
Japan	12	401	1	31
Korea, Republic of	2	134	1	42
Philippines	1	14	–	–
Singapore	1	147	–	–
Taiwan	(3/)	61	1	50
Thailand	2	155	–	–
Other 7/	2	884	1	7
Total	20	1,830	3	134
Oceania, other 8/	2	96	(3/)	4
Middle East, other 9/	1	228	(3/)	9
Africa:				
Equatorial Guinea	23	75	–	–
South Africa, Republic of	12	9	–	–
Other 10/	1	101	–	–
Total	36	185	–	–
Grand Total	1,160	18,100	368	5,160

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ F.a.s. (free alongside ship) value of material at U.S. port of export; based on transaction price including all charges incurred in placing material alongside ship.
3/ Less than 1/2 unit.
4/ Includes Aruba, Barbados, Bermuda, Cayman Islands, the Dominican Republic, El Salvador, Grenada, Guadeloupe, Guatemala, Haiti, Honduras, Jamaica, Panama, Saint Kitts and Nevis, and Saint Lucia.
5/ Includes Bolivia, Brazil, Chile, Colombia, and Uruguay.
6/ Includes Denmark, France, Ireland, Italy, Netherlands, Norway, Romania, and Switzerland.
7/ Includes China, India, Indonesia, Malaysia, and Pakistan.
8/ Includes Australia and New Zealand.
9/ Includes Israel, Kuwait, Saudi Arabia, the United Arab Emirates, and Yemen.
10/ Includes Algeria and Nigeria.

Source: Bureau of the Census.

TABLE 13
U.S. IMPORTS FOR CONSUMPTION OF CONSTRUCTION SAND AND GRAVEL, BY COUNTRY 1/

(Thousand metric tons and thousand dollars)

Country or Territory	1995 Quantity	1995 C.i.f. value 2/	1996 Quantity	1996 C.i.f. value 2/
Australia	14 r/	1,350	7	1,080
Bahamas, The	189 r/	438	159	410
British Virgin Islands	4	69	1	8
Canada	786 r/	5,590	965	8,100
Dominica	17 r/	242	22	284
France	1	258	1	326
Germany	2 r/	664	(3/)	292
Japan	7 r/	792	2	534
Martinique	21 r/	212	–	–
Mexico	68 r/	651	51	1,260
Netherlands Antilles	(3/)	2	32	401
United Kingdom	1	668	3	882
Other 4/	5 r/	1,020 r/	22	2,250
Total	1,120	12,000	1,260	15,800

r/ Revised.
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ C.i.f. (cost, insuance, freight) value of material at U.S. port of entry; based on purchase price and includes all charges (except U.S. import duties) in bringing material from foreign country to alongside carrier.
3/ Less than 1/2 unit.
4/ Includes Antigua and Barbuda (1996), Bosnia-Herzegovina (1996), China, the Dominican Republic, India, Macao (1995), Namibia (1996), New Zealand, Singapore (1995), and Venezuela.

Source: Bureau of the Census.

TABLE 14
RECYCLED ASPHALT AND CONCRETE SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY REGION 1/

Region/Division	Recycled asphalt 1995 Quantity (thousand metric tons)	Recycled asphalt 1995 Value (thousands)	Recycled asphalt 1995 Unit value	Recycled asphalt 1996 Quantity (thousand metric tons)	Recycled asphalt 1996 Value (thousands)	Recycled asphalt 1996 Unit value	Recycled concrete 1995 Quantity (thousand metric tons)	Recycled concrete 1995 Value (thousands)	Recycled concrete 1995 Unit value	Recycled concrete 1996 Quantity (thousand metric tons)	Recycled concrete 1996 Value (thousands)	Recycled concrete 1996 Unit value
Northeast:												
New England	193	$739	3.83	276	$1,020	3.69	212	$768	3.62	165	$794	4.81
Middle Atlantic	W	W	3.60	21	129	6.14	351	1,520	4.34	362	2,370	6.54
Midwest:												
East North Central	401	1,360	3.38	549	1,750	3.19	592	2,390	4.04	425	1,920	4.52
West North Central	582	1,860	3.20	394	1,260	3.19	1,290	2,790	2.16	1,180	3,140	2.65
South:												
South Atlantic	347	1,850	5.32	542	2,210	4.08	261	1,180	4.51	179	734	4.10
East South Central	224	966	4.31	291	889	3.05	--	--	--	--	--	--
West South Central	W	W	7.36	16	49	3.06	3	15	5.00	28	42	1.50
West:												
Mountain	1,150	5,950	5.17	463	2,010	4.35	383	1,470	3.84	419	1,570	3.76
Pacific 2/	563	3,010	5.35	1,190	4,980	3.85	501	2,120	4.23	1,270	4,530	3.58
Total	3,510	16,000	4.56	3,740	14,300	3.82	3,600	12,300	3.41	4,030	15,100	3.75

W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Excludes Hawaii.

TABLE 15
RECYCLED ASPHALT SOLD OR USED BY SAND AND GRAVEL PRODUCERS IN THE UNITED STATES, BY STATE 1/

State	1995			1996		
	Quantity (thousand metric tons)	Value (thousands)	Unit value	Quantity (thousand metric tons)	Value (thousands)	Unit value
Alabama	41	$262	$6.39	12	$50	$4.17
Alaska	W	W	5.90	W	W	4.35
Arizona	W	W	5.67	80	592	7.40
California	357	1,450	4.06	678	3,040	4.49
Colorado	135	628	4.65	43	174	4.05
Connecticut	24	39	1.63	W	W	7.60
Florida	2	14	7.00	–	–	–
Idaho	163	319	1.96	W	W	1.87
Illinois	W	W	7.50	127	214	1.69
Indiana	–	–	–	28	217	7.75
Iowa	10	33	3.30	10	50	5.00
Kansas	W	W	3.26	72	255	3.54
Louisiana	–	–	–	5	36	7.20
Maine	80	402	5.03	125	608	4.86
Maryland	W	W	3.84	–	–	–
Massachusetts	61	210	3.44	122	280	2.30
Michigan	242	919	3.80	141	584	4.14
Minnesota	487	1,470	3.01	297	868	2.92
Mississippi	177	680	3.84	177	525	2.97
Montana	57	240	4.21	132	425	3.22
Nebraska	–	–	–	5	25	5.00
Nevada	W	W	10.48	–	–	–
New Hampshire	25	76	3.04	21	79	3.76
New Jersey	W	W	3.60	10	46	4.60
New Mexico	200	827	4.14	87	422	4.85
New York	–	–	–	10	72	7.20
North Carolina	238	1,420	5.98	318	1,290	4.05
North Dakota	W	W	5.83	W	W	5.33
Ohio	W	W	1.10	15	82	5.47
Oregon	38	290	7.63	35	399	11.40
Pennsylvania	–	–	–	W	W	6.00
Rhode Island	2	5	2.50	–	–	–
South Carolina	W	W	3.85	224	924	4.13
South Dakota	60	266	4.43	W	W	6.00
Tennessee	5	24	4.80	103	314	3.05
Texas	22	W	W	W	W	1.08
Utah	143	396	2.77	W	W	3.50
Vermont	2	7	3.50	3	13	4.33
Washington	116	965	8.32	381	1,130	2.96
Wisconsin	119	380	3.19	239	656	2.74
Wyoming	W	W	6.62	35	234	6.69
Total	3,510	16,000	4.56	3,740	14,300	3.82

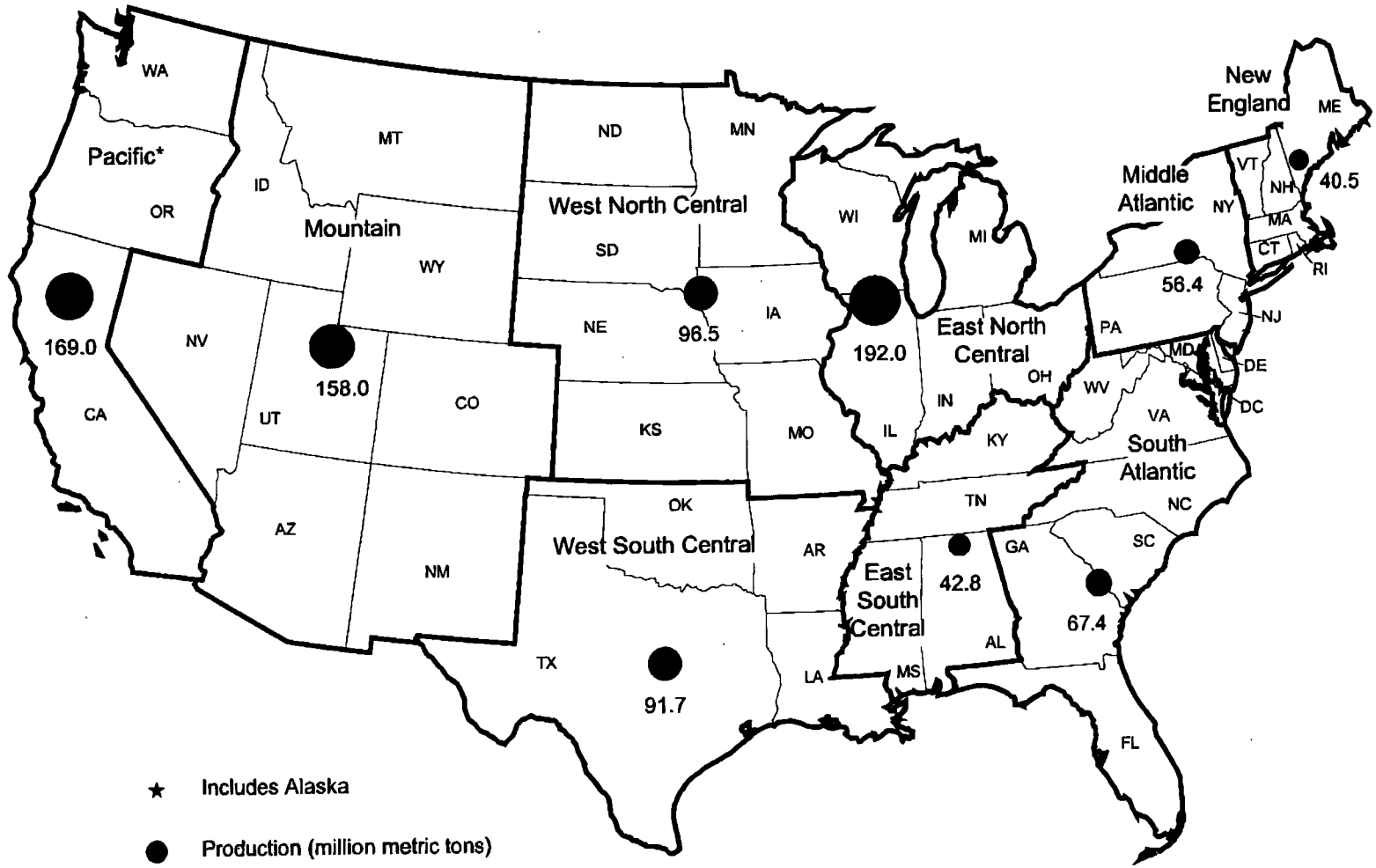
W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 16
RECYCLED CONCRETE SOLD OR USED BY SAND AND GRAVEL PRODUCERS IN THE UNITED STATES, BY STATE 1/

State	1995			1996		
	Quantity (thousand metric tons)	Value (thousands)	Unit value	Quantity (thousand metric tons)	Value (thousands)	Unit value
Alaska	6	$41	$6.83	–	–	–
Arizona	–	–	–	9	$10	$1.11
California	434	1,790	4.13	1,040	3,710	3.57
Colorado	80	381	4.76	57	273	4.79
Connecticut	68	110	1.62	–	–	–
Idaho	W	W	3.33	W	W	3.00
Illinois	70	489	6.99	124	552	4.45
Indiana	W	W	3.33	W	W	4.04
Iowa	5	26	5.20	69	405	5.87
Kansas	1	2	2.00	2	5	2.50
Maine	–	–	–	11	58	5.27
Maryland	W	W	3.40	92	203	2.21
Massachusetts	132	594	4.50	153	736	4.81
Michigan	361	1,210	3.36	106	513	4.84
Minnesota	1,170	2,320	1.97	1,120	2,730	2.44
Montana	W	W	3.19	W	W	4.61
Nevada	W	W	3.23	W	W	3.32
New Hampshire	W	W	5.60	W	W	2.45
New Jersey	W	W	3.31	W	W	4.00
New Mexico	21	61	2.90	88	393	4.47
New York	234	1,130	4.84	360	2,350	6.54
North Carolina	W	W	7.19	W	W	5.60
North Dakota	W	W	4.00	–	–	–
Ohio	W	W	5.69	W	W	7.73
Oregon	W	W	2.00	65	271	4.17
Pennsylvania	W	W	5.52	W	W	5.50
Rhode Island	2	5	2.50	–	–	–
South Carolina	W	W	8.91	W	W	6.67
South Dakota	111	433	3.90	–	–	–
Texas	W	W	5.00	28	42	1.50
Utah	5	15	3.00	W	W	2.05
Vermont	5	30	6.00	–	–	–
Washington	61	283	4.64	160	547	3.42
Wisconsin	45	117	2.60	59	185	3.14
Wyoming	24	189	7.88	W	W	6.67
Total 2/	3,600	12,300	3.41	4,030	15,100	3.75

W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Excludes Hawaii.
2/ Data are rounded to three significant digits; may not add to totals shown.

FIGURE 1
PRODUCTION OF CONSTRUCTION SAND AND GRAVEL IN THE UNITED STATES IN 1996, BY GEOGRAPHIC DIVISION



U.S. Department of the Interior • U.S. Geological Survey

MINERAL INDUSTRY SURVEYS

CRUSHED STONE

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Crushed stone is one of the most accessible natural resources and a major basic raw material used by construction, agriculture, and other industries utilizing complex chemical and metallurgical processes. Despite the relative low value of its basic products, the crushed stone industry is a major contributor to and an indicator of the economic well-being of the Nation.

A total of 1.33 billion metric tons of crushed stone was produced for consumption in the United States in 1996, a 5.3% increase compared with the total production of 1995. This tonnage represents the highest production level ever recorded in the United States, indicating a continued increase in the demand for construction aggregates. *(See table 1.)*

About three-quarters of the crushed stone production continued to be limestone and dolomite, followed, in order of volume, by granite, traprock, sandstone and quartzite, miscellaneous stone, marble, calcareous marl, slate, volcanic cinder and scoria, and shell. *(See table 2.)*

Foreign trade of crushed stone continued to remain relatively small. Exports decreased 45.9% to 3.3 million tons, and the value decreased only 8.4% to $36 million compared with that of 1995.

Imports of crushed stone, including calcium carbonate, increased 4.1% to 11.3 million tons, and the value decreased slightly to $91.8 million. Domestic apparent consumption of crushed stone, which is defined as production for consumption (sold or used) plus imports minus exports, was 1.34 billion tons. *(See tables 1, 22, and 23.)*

Legislation

The Department of Transportation and Related Agencies Appropriation Act of 1997 (Public Law 104-205) was signed by the President on October 1, 1996. The act appropriated a record $20.3 billion for highway funding, an increase of $313 million over that of fiscal year 1996. The act also appropriated $1.46 billion for the Airport Improvement Program, an increase of $10 million over that of fiscal year 1996.

Production

Domestic production data for crushed stone are derived by the U.S. Geological Survey (USGS) from voluntary surveys of U.S. producers.

Of the 4,070 crushed stone operations surveyed, 3,117 operations with 3,645 quarries owned by 1,493 companies were active. Of these, 2,461 operations with 2,686 quarries, representing 79% of the total number of operations and 73.7% of the total number of quarries, operated by 1,013 companies reported to the USGS. Their total production represented 86.3% of the total U.S. crushed stone output. Of the 2,461 reporting operations, 659 operations with 693 quarries owned by 191 companies did not report a breakdown by end use. Their production represented 27.8% of the U.S. total and is included in table 13 under "Unspecified, actual" uses. The nonrespondent's production was estimated using employment data and/or adjusted production reports from prior years. The estimated production from 656 nonresponding operations with 959 quarries owned by 480 companies represented 13.7% of the U.S. total and is included in table 13 under "Unspecified, estimated" uses.

A total of 817 quarries were either idle or presumed to have been idle in 1996 because no information was available to estimate their production. Since the 1995 survey, 190 operations were closed down. Most of the idle or closed operations were small, temporary quarries operated by State or local governments.

A total of 1.33 billion tons of crushed stone was produced for consumption in the United States in 1996, a 5.3% increase compared with the revised 1995 total. This tonnage represents the highest production level ever recorded in the United States. *(See table 1.)* Of this total, 955 million tons, or 71.8%, was limestone and dolomite, 202 million tons, or 15.2%, was granite, and 95 million tons, or 7.1%, was traprock. The remaining 78 million tons, or 5.9%, was shared, in descending order of quantity, by sandstone and quartzite, miscellaneous stone, marble, calcareous marl, slate, volcanic cinder and scoria, and shell. *(See table 2.)*

A comparison of the four geographic regions indicates that in 1996, the South continued to lead the Nation in the production of crushed stone with 620 million tons, or 46.4%, of the total, followed by the Midwest with 397 million tons, or 29.8%, and the Northeast with 181 million

tons, or 13.6%. About 76% of the total U.S. crushed stone output was produced in two geographic regions, the South and the Midwest. *(See table 3.)*

Of the nine geographic divisions, the South Atlantic led the Nation in the production of crushed stone with 319 million tons, or 24%, of the U.S. total. It was followed by the East North Central division with 249 million tons, or 18.7%, and the East South Central with 155 million tons, or 11.7%.

A comparison of the production data by the nine geographic divisions for 1995 and 1996 indicates that the output of crushed stone increased in all regions. The largest increases were recorded in the Mountain, +10.6%; the East South Central, +8.1%; and the Middle Atlantic, +7.8%.

Crushed stone was produced in every State except Delaware and North Dakota. The 10 leading States in the production of crushed stone were, in order of volume, Pennsylvania, Texas, Florida, Missouri, Illinois, Ohio, Georgia, Virginia, Kentucky, and North Carolina. Their combined production represented 51.4% of the national total.

Crushed stone was produced by 1,493 companies at 3,117 operations with 3,645 quarries. Leading U.S. producers were, in order of volume, Vulcan Materials Co., Martin-Marietta Aggregates, Cornerstone Construction & Materials, Inc., CSR America Inc., and Redland Aggregates North America.

In March, Tarmac America, Inc., of Norfolk, VA, announced the completion of an exchange of assets between Tarmac PLC of Wolverhampton, United Kingdom, and George Wimpey PLC of London, United Kingdom, in which Tarmac traded its private sector housing division in the UK for Wimpey's minerals and construction businesses. As the result of this exchange, Tarmac America acquired three quarries in Pennsylvania and New Jersey, five quarries in Canada, and 10 aggregates depots in Pennsylvania, Maryland, New Jersey, and Delaware (Rock Products, 1996).

In May, Rogers Group, Inc., of Nashville, TN, acquired three quarries known as M&M Rock located around Conway, AR, from McConnell Materials of Conway, AR,. The acquisition also included two asphalt plants and a concrete plant (Aggregates Manager, 1996c).

In October, Rogers Group acquired the Tidwell Quarry located in Hot Springs County, AR, from Tidwell Construction Co., Inc., and renamed it Glen Rose Quarry (Aggregates Manager, 1996b).

In November, Redland Genstar, Inc., of Hunt Valley, MD, sold its Middletown, VA, limestone quarry to Chemstone Corp., of Strasburg, VA, a subsidiary of Global Stone, Inc., of Oakville, Ontario, Canada (Pit & Quarry, 1996).

In October Oldcastle Inc./Materials Group of Washington, DC, a subsidiary of CRH PLC of Dublin, Ireland, announced the acquisition of Tilcon Inc. of New Britain, CT, and its 60 operations located in Connecticut, Delaware, Maine, Massachussettes, New Hampshire, New Jersey, New York, Rhode Island, and Vermont (Aggregates Manager, 1996a).

In November, Vulcan Materials Co. of Birmingham, AL, reported the purchase of one quarry from Black Rock Quarries, Inc., of Black Rock, AR.

Limestone.—The 1996 output of crushed limestone, including some dolomite, increased by 6.9% to 869 million tons valued at $4.4 billion compared with the revised 1995 total. *(See table 2.)* In addition to the quarries reporting only limestone, 60 operations with 62 quarries reported producing limestone and dolomite without making a distinction between the two kinds of stone. Their combined production, of 25.6 million tons was included with the limestone. The limestone totals shown in this chapter, therefore, include an undetermined amount of dolomite in addition to the dolomite reported separately.

Limestone was produced by 879 companies at 1,854 operations with 1,998 quarries in 47 States. In addition, 43 companies with 60 operations and 62 quarries reported producing limestone and dolomite from the same quarries.

The leading producing States were, in order of tonnage, Texas, Florida, Missouri, Kentucky, and Illinois; these five States accounted for 38.3% of the total U.S. output. *(See table 8.)* The leading producers were, in order of volume, Vulcan Materials Co., Martin Marietta Aggregates, Cornerstone Construction & Materials, Inc., CSR America, Inc., and Rogers Group, Inc.

Dolomite.—Production of dolomite decreased by 1.0% to 86 million tons valued at $447 million compared with the revised 1995 total. *(See table 2.)* Crushed dolomite was reportedly produced by 96 companies at 165 operations with 175 quarries in 25 States. An additional undetermined amount of dolomite is included in the total crushed limestone.

The leading producing States were, in order of tonnage, Ohio, Pennsylvania, Illinois, Michigan and New York; these five States accounted for 59.5% of the total U.S. output. (*See table 8.*) The leading producers were Cornerstone Construction & Materials, Inc., S.E. Johnson Co./Stoneco, Inc., Oldcastle Inc., National Lime & Stone Co., and ASARCO Incorporated/American Limestone Co.

Marble.—Production of crushed marble increased by 2.2% to 6.1 million tons valued at $42.6 million compared with 1995. *(See table 2.)* Crushed marble was produced by 14 companies with 24 operations and 49 quarries in 11 States. *(See table 9.)* The leading producers of crushed marble were, in order of tonnage, Florida Rock Industries, Inc., Georgia Marble Co., and CAMAS America, Inc.

Calcareous Marl.—Output of marl increased by 1.2% to 3.6 million tons valued at $11.4 million compared with the revised 1995 total. *(See table 2.)* Marl was produced by 11 companies with 11 quarries in 6 States. *(See table 9.)* The leading producers were, in order of tonnage, Capitol Aggregates Inc., Giant Group Ltd., and Blue Circle America, Inc.

Shell.—Shell is derived mainly from fossil reefs or oyster shell. The output of crushed shell decreased by 26.3% to

1.7 million tons valued at $6.6 million. *(See table 2.)* Crushed shell was produced by seven companies with seven operations in four States. The leading producers were, in order of tonnage, Quality Aggregates, Inc., Panther Crushing. Inc., and Leisey Shell Corp.

Granite.—The output of crushed granite increased by 3.2% to 202 million tons valued at $1.3 billion. *(See table 2.)* Crushed granite was produced by 152 companies at 326 operations with 357 quarries in 37 States.

The leading States were, in order of tonnage, Georgia, North Carolina, Virginia, South Carolina, and Arkansas; these five States accounted for 72.8% of the U.S. output. *(See table 10.)* The leading producers were, in order of tonnage, Vulcan Materials Co., Martin Marietta Aggregates, Cornerstone Construction & Materials, Inc., Blue Circle America, Inc., and Florida Rock Industries, Inc.

Traprock.—Production of crushed traprock decreased by 2.7% to 94.6 million tons valued at $572.6 million. *(See table 2.)* Traprock was produced by 256 companies at 361 operations with 559 quarries in 27 States.

The leading States were, in order of tonnage, Oregon, Virginia, Washington, New Jersey, and California; these five States accounted for 64.4% of U.S. output. *(See table 10.)* The leading producers were, in order of tonnage, Vulcan Materials Co., Luck Stone Corp., Oldcastle Inc./Materials Group,, Stavola, Inc./Traprock Industries, and Mac Aquisitions LP DBA Meridian Aggregates.

Sandstone and Quartzite.—The combined output of crushed sandstone and quartzite increased by 7% to 37.4 million tons valued at $220.7 million. *(See table 2.)* Crushed sandstone was produced by 105 companies at 134 operations with 151 quarries in 26 States, and crushed quartzite was produced by 33 companies at 37 operations with 53 quarries in 21 States.

The leading producing States were, in order of tonnage of sandstone and quartzite, Arkansas, Pennsylvania, South Dakota, New York, and Vermont; their combined production accounted for 52.6% of the U.S. output. *(See table 10.)* The leading producers of sandstone were, in order of tonnage, Ashland Oil, Inc./Arkola Sand and Gravel Co., Martin Marietta Aggregates, and Mac Aquisitions LP DBA Meridian Aggregates Co., and the leading producers of quartzite were Nova Materials Inc., L.G. Everist Inc., and Sweetman Construction Co.

Slate.—The output of crushed slate increased by 14.2% to 2.8 million tons valued at $22.9 million. *(See table 2.)* Crushed slate was produced by 16 companies at 18 operations with 22 quarries in 12 States.

Most of the crushed slate was produced in North Carolina. The leading producers were, in order of tonnage, Martin Marietta Aggregates, Vulcan Materials Co., and Lesuer-Richmond Slate Corp.

Volcanic Cinder and Scoria.—Production of volcanic cinder and scoria increased 9.3% to 2.1 million tons valued at $13.4 million. *(See table 2.)* Volcanic cinder and scoria were produced by 22 companies from 28 operations with 77 quarries in 13 States.

The leading producing States were, in order of volume, California, New Mexico, and Arizona; their combined production accounted for 45.9% of the total U.S. output. *(See table 11.)* Leading producers were, in order of tonnage, Martin Marietta, Stoney Point Rock Quarry Inc., and Byley H.G. & Sons Construction Co., Inc.

Miscellaneous Stone.—Output of other kinds of crushed stone increased by 16.1% to 24.8 million tons valued at $147.3 million. *(See table 2.)* Miscellaneous stone was produced by 76 companies at 91 operations with 126 quarries in 24 States.

The leading producing States were, in order of volume, Pennsylvania, California, and Texas; their combined production accounted for 49.5% of the total U.S. output. *(See table 11.)*

Consumption and Uses

Crushed stone production reported to the USGS is actually material that was either sold or used by producers. Stockpiled production is not included in the reported quantities. The "sold or used" tonnage, therefore, represents the amount of production released for domestic consumption or export in a given year. Because some of the crushed stone producers did not report a breakdown by end use, their total production is included in "Unspecified, actual" use. The estimated production of nonrespondents is included in "Unspecified, estimated" use.

In 1996, U.S. consumption of crushed stone was 1.33 billion tons, a 5.3% increase compared with that of 1995. Of the 1.33 billion tons of crushed stone consumed, 551.4 million tons or 41.5% of the total was "Unspecified, actual and estimated" uses. Of the remaining 778.6 million tons reported by uses by the producers, about 83.2% was used as construction aggregates, mostly for highway and road construction and maintenance; 13.9%, for chemical and metallurgical uses, including cement and lime manufacture; 1.9%, for agricultural uses; and 0.8% for special uses and products. *(See table 13.)* To provide a more accurate estimation of the consumption patterns for crushed stone, the "Unspecified" uses are not included in the above percentages. It is recommended that in any use pattern study or marketing analysis, the quantities included in "Unspecified" uses be distributed among the reported uses by applying the above percentages to the "Unspecified" uses, total.

Limestone.—Of the 868.9 million tons of crushed limestone consumed, 341.7 million tons or 39.3%, was "Unspecified, actual and estimated" uses. Of the remaining 527.2 million tons of crushed limestone reported by uses, 77.3%, was used as construction aggregates; 19.3%, for chemical and metallurgical uses including cement and lime manufacturing; 2.3%, for agricultural uses; and 1.1% for special uses and products. *(See table 14.)*

Dolomite.—Of the 86 million tons of crushed dolomite consumed, 25.8 million tons or 30%, was "Unspecified,

actual and estimated" uses. Of the remaining 60.2 million tons of crushed dolomite reported by uses, 89.7%, was used as construction aggregates; 4.4%, for chemical and metallurgical uses; 3.2%, for agricultural uses; and 2.7%, for special and miscellaneous uses. An additional undefined amount of dolomite consumed in a variety of uses, mostly construction aggregates, is reported with the limestone. *(See table 14.)*

Marble.—Of the 6.1 million tons of crushed marble consumed, 4.3 million tons, or 70.7%, was reported as "Unspecified, actual and estimated" uses. Of the remaining 1.8 million tons of crushed marble reported by uses, 1.5 million tons, or 85.8%, was used as construction aggregates; 207,000 tons, or 11.6%, as special and miscellaneous uses, including fillers and extenders; and 46,000 tons, or 2.6%, for chemical and metallurgical purposes. *(See table 16.)*

Calcareous Marl.—Of the 3.6 million tons of crushed calcareous marl consumed, 1.1 million tons or 30.2%, was reported as " Unspecified, actual and estimated" uses. Of the remaining 2.5 million tons of crushed marl reported by uses, 77.2% , was used for cement manufacturing; and most of the remaining 22.8%, as construction aggregates and for agricultural uses.

Shell.—Of the 1.7 million tons of crushed shell consumed, 86%, was used as construction aggregates; 12.8%, for cement manufacturing; and 1.2%, as poultry grit.

Granite.—Of the 202 million tons of crushed granite consumed, 104.4 million tons, or 51.7%, was reported as "Unspecified, actual and estimated" uses. The remaining 97.6 million tons was used as construction aggregates. *(See table 17.)*

Traprock.—Of the 94.6 million tons of crushed traprock consumed, 32.4 million tons, or 34.2%, was reported as "Unspecified, actual and estimated" uses. The remaining 62.1 million tons was used as construction aggregates. *(See table 17.)*

Sandstone and Quartzite.—Of the 27.7 million tons of crushed sandstone consumed, 16 million tons, or 57.7%, was reported as "Unspecified, actual and estimated" uses. Of the remaining 11.7 million tons of crushed sandstone reported by uses, 11.2 million tons or 95.8%, was used as construction aggregates. *(See table 18.)*

Of the 9.7 million tons of crushed quartzite consumed, 4.7 million tons or 48.3% was reported as "Unspecified, actual and estimated" uses. Of the remaining 5 million tons of crushed quartzite reported by uses, 90.1% was used as construction aggregates. *(See table 18.)*

Volcanic Cinder and Scoria.—Of the 2.1 million tons of volcanic cinder and scoria consumed, 804,000 tons or 39.2% was reported as "Unspecified, actual and estimated" uses. Most of the remaining 1.2 million tons of crushed volcanic cinder and scoria was used as construction aggregates. *(See table 19.)*

Miscellaneous Stone.—Of the 33 million tons of miscellaneous crushed stone consumed, 21.3 million tons, or 64.5%, was reported as "Unspecified, actual and estimated" uses. Of the remaining 11.7 million tons reported by uses, 8.6 million tons, or 73.5%, was used as construction aggregates, and 4.5 million tons, or 39.7%, was used for cement manufacturing. *(See table 19.)*

Recycling

As the recycling of most waste materials increases, the aggregates producers are recycling more cement concrete, and asphalt concrete materials, recovered from construction projects to produce concrete aggregates and asphalt aggregates. The annual survey of crushed stone producers now collects information on recycling of cement and asphalt concretes produced by the crushed stone producers only. No information on recycling of these materials by the construction or demolition companies is collected by the USGS.

Asphalt Concrete.—A total of 1.3 million tons of asphalt concrete valued at $8.6 million was recycled by 62 companies in 31 States. This volume represents a 14.6% decrease compared with that of 1995. *(See tables 20 and 21.)* The leading recycling States were, in descending order of tonnage, Massachusetts, Minnesota, and California. The leading recycling companies were, in order of tonnage produced, Bardon Group Inc., Oldcastle Inc./Materials Group, and Mount Hope Rock Products, Inc.

Cement Concrete.—A total of 1.2 million tons of cement concrete valued at $6.3 million was recycled by 43 companies in 16 States. This tonnage represents a 28.3% increase compared with that of 1995. *(See tables 20 and 22.)* The leading recycling States were, in descending order of tonnage, California, Massachusetts, and Wisconsin. The leading companies were, in order of tonnage produced, Dell Materials, Vulcan Materials Co., and Stoneway Concrete, Inc.

Prices

Prices in this chapter are f.o.b. plant, usually at the first point of sale or captive use. This value does not include transportation from the plant or yard to the consumer. It does, however, include all costs of mining, processing, in-plant transportation, overhead costs and profit.

The average unit price per ton of crushed stone increased by 1.1% to $5.40, compared with that of 1995. The average unit prices, by kind of stone, showed mostly modest increases of between 1.1% for limestone to 4.4% for traprock, as well as decreases for shell (-59%), marble (-25.7%), slate (-5.5%), and sandstone and quartzite (-1.1%). *(See table 2.)*

Transportation

For 575.1 million tons, or 43.2%, of the total 1.33 billion tons of crushed stone produced for consumption in 1996, no means of transportation was reported by the producers. Of the remaining 755 million tons of crushed stone, 571.7 million tons, or 75.7%, was reported as being transported by truck from the processing plant or quarry to the first point

of sale or use; 7.8%, by rail; and 4.3%, by waterway. About 9.2% of the specified production was reported as not having been transported and, therefore, was used on-site. Information regarding means of transportation used by the producers to ship crushed stone in each geographic region is provided in table 23.

Foreign Trade

The widespread distribution of domestic crushed stone deposits and the high cost of transportation limits foreign trade to mostly local transactions across international boundaries. U.S. imports and exports are small, representing less than 1% of the domestic consumption. Shipments of crushed stone by water from Canada and especially Mexico, however, continue to increase.

Exports.—Exports of crushed stone decreased by 45.9% to 3.3 million tons compared with that of 1995, and the value decreased by only 8.4% to $36 million. About 92.7% of the exported crushed stone was limestone. Canada was the major destination with 79.7% of the total crushed stone, followed by Japan with 5.7%. *(See table 24.)*

Imports.—Imports of crushed stone increased by 4.1% to 11.3 million tons compared with that of 1995, and the value decreased by 0.8% to $89.6 million. About 88.9% of the imported crushed stone was limestone. Imports of natural calcium carbonate fines decreased from 7,000 to 3,000 tons. *(See table 25.)*

Shipments of crushed stone from the Bahamas, Canada, and Mexico into the United States continued in 1996. The imported crushed stone was used mostly as construction aggregates or for cement manufacturing. This trend is expected to continue, and the volume of imports, especially from Mexico, to increase.

Outlook

The demand for crushed stone in 1997 is expected to be about 1.38 billion tons, a 4% increase over that of 1996. Gradual increases in demand for construction aggregates are anticipated after 1997 as well, on the basis of the volume of work on the infrastructure that will be financed by the new Surface Transportation Efficiency Act and the U.S. economy in general. The projected increases will be influenced by construction activity in the public, as well as the private construction sectors.

Crushed stone f.o.b. prices are not expected to increase significantly. The delivered prices of crushed stone are, however expected to increase, especially in and near metropolitan areas, mainly because more aggregates are transported from distant sources.

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TABLE 1
SALIENT CRUSHED STONE STATISTICS 1/

(Thousand metric tons and thousand dollars)

		1992	1993	1994	1995	1996
Sold or used by producers:						
Quantity 2/		1,050,000	1,120,000	1,230,000	1,260,000	1,330,000
Value 2/		$5,590,000 e/	$5,930,000	$6,620,000	$6,740,000 r/	$7,180,000
Exports	value	$43,400	$39,300	$38,100	$39,300	$36,300
Imports 3/	do.	$60,700	$74,300	$77,800	$91,900	$91,800

e/ Estimated. r/ Revised.

1/ Data are rounded to three significant digits.

2/ Does not include American Samoa, Guam, Puerto Rico, and the U.S. Virgin Islands.

3/ Excludes precipitated calcium carbonate.

TABLE 2
CRUSHED STONE SOLD OR USED IN THE UNITED STATES, BY KIND 1/

	1995				1996			
Kind	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone 2/	2,007	813,000 r/	$4,060,000 r/	$4.99 r/	2,060	869,000	$4,390,000	$5.05
Dolomite	183 r/	85,100 r/	436,000 r/	5.13 r/	175	86,000	447,000	5.20
Marble	42	5,960	52,400	8.80 r/	49	6,090	42,600	7.00
Calcareous marl	13 r/	3,590 r/	10,900 r/	3.04 r/	11	3,640	11,400	3.15
Shell	11	2,320	14,300	6.18 r/	7	1,710	6,640	3.89
Granite	366 r/	196,000 r/	1,240,000 r/	6.34 r/	357	202,000	1,310,000	6.50
Traprock	589	97,200 r/	563,000 r/	5.79 r/	559	94,600	573,000	6.05
Sandstone and quartzite	253 r/	35,000 r/	208,000 r/	5.96 r/	204	37,400	221,000	5.90
Slate	18 r/	2,480 r/	21,200 r/	8.56 r/	22	2,830	22,900	8.11
Volcanic cinder and scoria	76	1,880	12,000	6.38	77	2,050	13,400	6.54
Miscellaneous stone	125 r/	21,400 r/	125,000 r/	5.83 r/	126	24,800	147,000	5.93
Total	XX	1,260,000	6,740,000 r/	5.36 r/	XX	1,330,000	7,180,000	5.40

r/ Revised. XX Not applicable.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Includes limestone-dolomite reported with no distinction between the two kinds of stone.

TABLE 3
CRUSHED STONE 1/ SOLD OR USED IN THE UNITED STATES, BY REGION 2/

(Thousand metric tons and thousand dollars)

	1995		1996	
Region/Division	Quantity	Value	Quantity	Value
Northeast:				
New England	28,500	206,000	28,800	203,000
Middle Atlantic	141,000	828,000	152,000	896,000
Midwest:				
East North Central	235,000	1,070,000	249,000	1,170,000
West North Central	146,000	735,000	148,000	765,000
South:				
South Atlantic	301,000	1,810,000	319,000	1,950,000
East South Central	144,000	702,000	155,000	758,000
West South Central	142,000	649,000	145,000	647,000
West:				
Mountain	35,300	199,000	39,100	229,000
Pacific	91,000 r/	548,000 r/	93,500	573,000
Total	1,260,000	6,740,000 r/	1,330,000	7,180,000

r/ Revised.

1/ Includes volcanic cinder and scoria.

2/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 4
CRUSHED STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996,
BY QUARTER AND DIVISION 1/

Region/Division	Quantity 1st quarter (thousand metric tons)	Percentage change 2/	Quantity 2d quarter (thousand metric tons)	Percentage change 2/	Quantity 3d quarter (thousand metric tons)	Percentage change 2/	Quantity 4th quarter (thousand metric tons)	Percentage change 2/	Total 3/ (thousand metric tons)	Value total 3/ (thousands)
Northeast:										
New England	900	-49.5	7,400	-19.7	8,800	-8.3	7,200	-3.4	24,300	$174,000
Middle Atlantic	17,600	-11.3	41,700	-1.1	50,500	9.3	42,500	28.1	152,000	899,000
Midwest:										
East North Central	26,500	-10.0	66,100	1.2	88,900	13.6	68,500	10.5	250,000	1,150,000
West North Central	22,600	-9.4	40,400	8.6	48,400	3.6	39,600	10.4	151,000	759,000
South:										
South Atlantic	58,800	-5.0	88,500	8.7	88,000	4.5	82,000	14.5	317,000	1,920,000
East South Central	26,800	-2.6	42,400	13.0	47,000	12.4	39,800	10.7	156,000	710,000
West South Central	33,600	9.9	35,900	-0.7	39,300	1.4	35,200	1.3	144,000	657,000
West:										
Mountain	6,000	3.2	9,900	8.3	10,700	-1.5	8,800	-4.0	35,400	198,000
Pacific 4/	16,700	7.0	22,000	5.3	24,900	1.6	22,100	15.2	85,700	476,000
Total 5/	209,600	-3.7	354,300	4.5	406,300	6.7	345,900	11.8	1,330,000	7,110,000

1/ As published in the "Crushed Stone and Sand and Gravel in the Fourth Quarter of 1996 Mineral Industry Surveys."
2/ All percentage changes are calculated by using unrounded totals. Percentage changes are based on the corresponding quarter of the previous year.
3/ Data may not add to totals shown because of independent rounding and differences between projected totals by States and by regions.
4/ Does not include Alaska and Hawaii.
5/ Includes Alaska, Hawaii, and "Other," see table 6.

TABLE 5
CRUSHED STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY STATE 1/ 2/

State	1995 Quantity (thousand metric tons)	1995 Value (thousands)	1995 Unit value	1996 Quantity (thousand metric tons)	1996 Value (thousands)	1996 Unit value
Alabama	33,600	$174,000	$5.19	38,900	$198,000	$5.09
Alaska 3/	2,430 r/ 4/	14,500 r/ 4/	5.97 r/	2,600 4/ 5/	16,500 4/ 5/	6.35
Arizona	5,520	32,600	5.91	6,800	40,600	5.97
Arkansas	25,500	169,000	6.64	26,400	158,000	5.96
California	43,700 6/ 7/	268,000 6/ 7/	6.14	46,700	295,000	6.31
Colorado	9,000	58,500	6.50	9,940	64,900	6.54
Connecticut	6,070 8/ 9/	45,500 8/ 9/	7.50	6,720	55,000	8.19
Florida	68,000	350,000	5.14	73,600 10/	394,000 10/	5.35
Georgia	60,600	373,000	6.14	63,400 6/	401,000 6/	6.33
Hawaii	7,450 11/ 12/	73,500 11/ 12/	9.87	6,560	77,500	11.82
Idaho	3,210 12/	14,000 12/	4.36	3,960 12/	20,200 12/	5.11
Illinois	61,400	335,000	5.46	66,500	364,000	5.47
Indiana	49,200 13/	234,000 13/	4.76	53,700 13/	254,000 13/	4.73
Iowa	35,300	210,000	5.96	34,400	202,000	5.88
Kansas	20,400	95,800	4.69	22,100	110,000	4.96
Kentucky	54,700	230,000	4.20	58,500 11/	243,000 11/	4.15
Louisiana	2,540 7/ 12/	26,700 7/ 12/	10.50	2,290 12/	23,900 12/	10.44
Maine	3,110	16,100	5.17	2,760	14,800	5.38
Maryland	24,200	158,000	6.54	22,400 6/ 14/	142,000 6/ 14/	6.33
Massachusetts	11,100	97,400	8.77	11,800 12/	91,600 12/	7.77
Michigan	37,500	127,000	3.38	38,600 5/ 12/	144,000 5/ 12/	3.72
Minnesota	11,300 9/ 14/	47,400 9/ 14/	4.19	12,100	59,000	4.88
Mississippi	1,990 10/	8,010 10/	4.03	2,180 10/	9,300 10/	4.26
Missouri	65,700 5/	305,000 5/	4.64	67,000	325,000	4.85
Montana	2,370 9/	9,920 9/	4.19	2,000	8,580	4.29
Nebraska	6,590	41,800	6.34	6,370	39,800	6.25
Nevada	2,410	21,400	8.90	3,080	25,200	8.18
New Hampshire	2,150 15/	9,150 15/	4.25	1,430 15/	8,650 15/	6.06
New Jersey	21,000	132,000	6.28	21,400	145,000	6.79
New Mexico	3,660	18,800	5.12	3,480 9/ 14/	18,800 9/ 14/	5.42
New York	39,500	204,000	5.15	43,600	233,000	5.34
North Carolina	57,300	384,000	6.69	57,200	394,000	6.89
Ohio	60,900	265,000	4.35	63,600	291,000	4.57
Oklahoma	31,100 7/	125,000 7/ 14/	4.02	28,300 7/ 14/	117,000 7/ 14/	4.14
Oregon	20,700	95,700	4.63	22,000	102,000	4.65
Pennsylvania	80,900	492,000	6.09	87,400	518,000	5.92
Rhode Island	1,250	9,140	7.30	1,440	9,680	6.74
South Carolina	22,000	132,000	5.98	23,800	146,000	6.15
South Dakota	5,420 5/ 12/	25,700 5/ 12/	4.74	5,640	28,700	5.09
Tennessee	52,600	286,000	5.43	55,100	305,000	5.53
Texas	81,100	310,000	3.82	86,500	341,000	3.94
Utah	4,140	14,800	3.58	4,380	19,100	4.35
Vermont	4,420	20,700	4.68	4,560	22,800	5.01
Virginia	55,400	326,000	5.89	59,700	351,000	5.87
Washington	15,800 4/ 6/	76,800 4/ 6/	4.85	15,400	81,400	5.27
West Virginia	11,800 8/	75,000 8/	6.38	12,700 8/	78,400 8/	6.16
Wisconsin	26,000	108,000	4.16	26,000	113,000	4.34
Wyoming	4,670	27,500	5.88	5,180	30,000	5.79
Other	6,620	69,300	10.47	9,400	53,000	5.64
Total	1,260,000	6,740,000 r/	5.34 r/	1,330,000	7,180,000	5.40

r/ Revised.

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ To avoid disclosing company proprietary data, certain State totals do not include all kinds of stone produced within the State; the portion not shown has been included with "Other."

3/ Data derived, in part, from the Alaska Division of Geological and Geophysical Surveys information.

4/ Excludes limestone-dolomite.

5/ Excludes granite.

6/ Excludes marble.

7/ Excludes shell.

8/ Excludes dolomite.

9/ Excludes quartzite.

10/ Excludes calcareous marl.

11/ Excludes sandstone.

12/ Excludes other.

13/ Excludes slate.

14/ Excludes traprock.

15/ Excludes limestone.

TABLE 6
CRUSHED STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996,
BY QUARTER AND STATE 1/

State	Quantity 1st quarter (thousand metric tons)	Percentage change 2/	Quantity 2d quarter (thousand metric tons)	Percentage change 2/	Quantity 3d quarter (thousand metric tons)	Percentage change 2/	Quantity 4th quarter (thousand metric tons)	Percentage change 2/	Total 3/ (thousand metric tons)	Value total 3/ (thousands)
Alabama	7,800	6.6	10,700	19.2	10,700	15.5	9,700	20.9	38,900	$204,000
Alaska 4/ 5/	--	--	--	--	--	--	--	--	3,500	21,500
Arizona 6/	--	--	--	--	--	--	--	--	5,250	31,200
Arkansas	5,500	2.9	7,000	4.8	7,300	1.1	6,500	4.8	26,400	177,000
California 5/	8,900	16.8	11,800	8.0	14,100	-1.0	11,900	8.6	46,700	289,000
Colorado	1,300	-9.3	3,100	51.6	3,000	-1.7	2,500	3.2	9,950	65,100
Connecticut 5/	100	-71.5	1,800	-4.2	2,300	10.1	1,100	-35.4	5,310	40,100
Delaware 4/	--	--	--	--	--	--	--	--	--	--
Florida	18,000	-3.2	18,000	4.3	17,700	9.3	17,700	10.5	71,300	371,000
Georgia	12,600	-2.0	18,600	13.5	17,500	2.9	15,600	9.0	64,300	399,000
Hawaii 4/ 5/	--	--	--	--	--	--	--	--	7,700	76,200
Idaho 5/ 6/	300	-31.8	300	-54.0	800	-18.4	700	-35.6	2,120	9,340
Illinois	7,100	-7.5	16,600	4.9	23,500	12.7	19,200	13.0	66,500	365,000
Indiana 5/	7,200	-4.7	13,400	5.2	19,400	23.8	14,600	10.3	54,600	262,000
Iowa	4,400	-6.6	10,000	-4.0	11,900	0.6	9,100	8.5	35,400	212,000
Kansas	4,200	4.4	6,300	22.0	6,400	4.3	6,400	28.3	23,400	111,000
Kentucky 5/	10,100	-7.3	14,900	13.5	19,400	20.7	14,900	1.3	59,200	252,000
Louisiana 5/ 6/	--	--	--	--	--	--	--	--	2,650	27,900
Maine	300	4.8	900	8.2	1,100	5.1	800	-9.1	3,160	16,400
Maryland	3,500	-21.0	7,300	6.3	7,900	9.8	7,700	34.5	26,400	174,000
Massachusetts	200	-64.5	2,700	-32.3	3,000	-15.5	3,100	6.3	9,020	79,400
Michigan	2,600	2.0	11,200	-4.3	13,700	6.3	11,400	10.1	38,900	132,000
Minnesota 5/	500	-6.9	3,400	8.9	5,300	16.0	2,900	-4.6	12,100	51,500
Mississippi 5/ 6/	--	--	--	--	--	--	--	--	2,300	9,300
Missouri 5/	12,300	-15.4	17,200	14.3	19,400	-0.7	18,100	9.2	67,000	315,000
Montana 5/ 6/	--	--	--	--	--	--	--	--	2,290	9,720
Nebraska	1,000	-14.6	1,900	12.3	2,000	-7.2	1,700	15.2	6,680	42,800
Nevada	500	1.2	600	-7.6	700	17.0	600	-13.3	2,370	21,200
New Hampshire 5/	90	-39.3	500	-1.6	800	-4.6	600	-8.6	1,990	8,570
New Jersey	2,200	-34.2	5,700	-7.2	6,500	4.8	6,800	28.2	21,200	134,000
New Mexico	600	-7.9	1,200	45.3	900	-29.5	700	-28.5	3,350	17,200
New York	3,400	-11.9	11,300	2.4	17,000	14.6	11,900	21.9	43,600	227,000
North Carolina	9,900	-7.6	16,700	8.9	16,300	-4.2	15,600	10.0	58,600	395,000
North Dakota 4/	--	--	--	--	--	--	--	--	--	--
Ohio	7,000	-18.4	18,000	1.5	22,300	13.2	16,200	9.5	63,600	280,000
Oklahoma 5/	6,700	3.3	7,600	-6.0	8,000	-9.3	7,200	-6.6	29,500	119,000
Oregon	4,500	-0.8	6,400	12.3	5,900	1.1	5,200	10.5	21,900	102,000
Pennsylvania	12,100	-5.1	24,700	-1.3	26,800	7.0	23,800	31.7	87,400	538,000
Rhode Island 6/	--	--	--	--	--	--	--	--	1,100	8,090
South Carolina	4,800	3.1	6,600	9.8	6,500	11.9	5,800	6.1	23,800	143,000
South Dakota 5/	500	-8.0	1,300	-15.5	2,600	31.8	1,300	-9.2	5,630	27,000

See footnotes at end of table.

TABLE 6 –Continued
CRUSHED STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996,
BY QUARTER AND STATE 1/

State	Quantity 1st quarter (thousand metric tons)	Percentage change 2/	Quantity 2d quarter (thousand metric tons)	Percentage change 2/	Quantity 3d quarter (thousand metric tons)	Percentage change 2/	Quantity 4th quarter (thousand metric tons)	Percentage change 2/	Total 3/ (thousand metric tons)	Value total 3/ (thousands)
Tennessee	8,100	-9.7	15,700	7.8	16,800	4.4	14,600	11.7	55,100	$245,000
Texas	20,900	14.3	20,600	-0.8	23,700	7.8	21,200	5.8	86,400	333,000
Utah	900	12.1	800	-23.6	1,100	-6.1	1,100	8.0	4,000	14,400
Vermont 5/	--	--	--	--	--	--	--	--	4,560	21,400
Virginia	8,900	-8.4	16,700	5.1	17,900	7.9	16,300	23.0	59,700	352,000
Washington 6/	3,400	-13.1	3,700	-18.4	4,700	18.5	5,400	61.5	17,200	84,500
West Virginia 6/	2,100	14.0	4,000	18.2	4,200	5.4	3,500	42.3	14,000	89,300
Wisconsin	2,400	-22.0	6,500	-7.9	10,000	6.3	6,900	7.5	25,800	108,000
Wyoming	700	45.3	1,600	-5.5	1,700	15.0	1,100	3.5	5,050	29,800
Other	--	--	--	--	--	--	--	--	7,000	73,500
Total 3/	XX	XX	XX	XX	XX	XX	XX	XX	1,330,000	7,110,000

XX Not applicable.
1/ As published in the "Crushed Stone and Sand and Gravel in the Fourth Quarter of 1996 Mineral Industry Surveys."
2/ All percentage changes are calculated by using unrounded totals. Percentage changes are based on the corresponding quarter of the previous year.
3/ Data may not add to totals shown because of independent rounding and differences between projected totals by States and by regions.
4/ State not included in quarterly survey.
5/ Owing to low number of companies, no production estimates by quarter were generated.
6/ To avoid disclosing proprietary data, certain State totals do not include all kinds of stone produced within the State; the portion not shown has been included with "Other."

TABLE 7
CRUSHED STONE SOLD OR USED IN THE UNITED STATES IN 1996,
BY REGION AND SIZE OF OPERATION 1/

Size range (metric tons)	Northeast				Midwest				South			
	Number of operations	Percentage of total	Quantity (thousand metric tons)	Percentage of total	Number of operations	Percentage of total	Quantity (thousand metric tons)	Percentage of total	Number of operations	Percentage of total	Quantity (thousand metric tons)	Percentage of total
Less than 25,000	41	9.0	277	(2/)	174	15.0	1,720	(2/)	57	5.0	533	(2/)
25,000 to 49,999	24	5.0	742	(2/)	106	9.0	3,610	(2/)	40	4.0	1,380	(2/)
50,000 to 99,999	34	7.0	2,410	1.0	154	14.0	10,300	2.0	82	8.0	5,750	(2/)
100,000 to 199,999	53	12.0	7,140	3.0	160	14.0	21,300	5.0	132	13.0	18,100	2.0
200,000 to 299,999	60	13.0	13,600	7.0	114	10.0	26,000	6.0	83	8.0	18,900	3.0
300,000 to 399,999	49	11.0	15,700	8.0	64	5.0	20,100	5.0	71	7.0	22,600	3.0
400,000 to 499,999	36	8.0	14,800	8.0	60	5.0	23,900	6.0	81	8.0	33,000	5.0
500,000 to 599,999	27	6.0	13,100	7.0	51	4.0	25,300	6.0	78	7.0	38,900	6.0
600,000 to 699,999	19	4.0	11,200	6.0	36	3.0	21,300	5.0	46	4.0	27,200	4.0
700,000 to 799,999	25	5.0	17,100	9.0	31	2.0	21,100	5.0	46	4.0	31,800	5.0
800,000 to 899,999	14	3.0	10,800	6.0	24	2.0	18,600	4.0	37	3.0	28,400	4.0
900,000 to 999,999	6	1.0	5,170	2.0	20	1.0	17,500	4.0	35	3.0	30,300	4.0
1,000,000 to 1,499,999	34	7.0	38,100	21.0	58	5.0	63,500	16.0	106	10.0	119,000	19.0
1,500,000 to 1,999,999	11	2.0	17,500	9.0	22	2.0	34,700	8.0	48	4.0	72,700	11.0
2,000,000 to 2,499,999	1	(2/)	1,920	1.0	10	(2/)	18,800	4.0	24	2.0	47,300	7.0
2,500,000 to 4,999,999	4	(2/)	11,700	6.0	13	1.0	38,900	9.0	23	2.0	66,200	10.0
5,000,000 and over	–	–	–	–	5	(2/)	30,100	7.0	7	(2/)	57,600	9.0
Total	438	100.0	181,000	100.0	1,102	100.0	397,000	100.0	996	100.0	620,000	100.0

Size range (metric tons)	West				U.S. total			
	Number of operations	Percentage of total	Quantity (thousand metric tons)	Percentage of total	Number of operations	Percentage of total	Quantity (thousand metric tons)	Percentage of total
Less than 25,000	159	27.0	1,450	1.0	431	13.0	3,980	(2/)
25,000 to 49,999	69	11.0	2,260	1.0	239	7.0	7,980	(2/)
50,000 to 99,999	92	15.0	6,180	4.0	362	11.0	24,700	1.0
100,000 to 199,999	83	14.0	10,500	8.0	428	13.0	57,000	4.0
200,000 to 299,999	57	9.0	13,100	9.0	314	10.0	71,600	5.0
300,000 to 399,999	26	4.0	8,180	6.0	210	6.0	66,600	5.0
400,000 to 499,999	16	2.0	6,510	4.0	193	6.0	78,100	5.0
500,000 to 599,999	16	2.0	8,010	6.0	172	5.0	85,300	6.0
600,000 to 699,999	13	2.0	7,730	5.0	114	3.0	67,500	5.0
700,000 to 799,999	7	1.0	4,700	3.0	109	3.0	74,700	5.0
800,000 to 899,999	3	(2/)	2,330	1.0	78	2.0	60,100	4.0
900,000 to 999,999	9	1.0	7,950	6.0	70	2.0	61,000	4.0
1,000,000 to 1,499,999	14	2.0	14,900	11.0	212	6.0	235,000	17.0
1,500,000 to 1,999,999	7	1.0	10,800	8.0	88	2.0	136,000	10.0
2,000,000 to 2,499,999	4	(2/)	8,320	6.0	39	1.0	76,300	5.0
2,500,000 to 4,999,999	6	1.0	19,600	14.0	46	1.0	137,000	10.0
5,000,000 and over	–	–	–	–	12	(2/)	87,700	6.0
Total	581	100.0	133,000	100.0	3,117	100.0	1,330,000	100.0

1/ Data are rounded to three significant digits; may not add to totals shown.

2/ Less than 1/2 unit.

TABLE 8
CRUSHED LIMESTONE AND DOLOMITE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY STATE 1/

(Thousand metric tons and thousand dollars)

State	Limestone		Dolomite	
	Quantity	Value	Quantity	Value
Alabama	34,800 2/	176,000 2/	W	W
Alaska 3/	W 2/	W 2/	–	–
Arizona	4,110	23,000	–	–
Arkansas	7,260	36,700	W	W
California	24,900	145,000	384	2,670
Colorado	2,840	15,200	–	–
Connecticut	W	W	W	W
Florida	71,000 2/	379,000 2/	W	W
Georgia	10,100 2/	65,600 2/	–	–
Hawaii	1,030	10,500	–	–
Idaho	1,370	7,920	–	–
Illinois	57,700 2/	319,000 2/	8,800	45,000
Indiana	46,500 2/	217,000 2/	7,170	37,400
Iowa	34,400 2/	202,000 2/	42	169
Kansas	21,400 2/	108,000 2/	–	–
Kentucky	58,500	243,000	–	–
Maine	1,410	7,410	–	–
Maryland	17,400	111,000	–	–
Massachusetts	2,140 2/	23,500 2/	–	–
Michigan	30,300	115,000	8,330	29,100
Minnesota	8,210	38,800	802	3,480
Mississippi	W	W	–	–
Missouri	63,300 2/	305,000 2/	2,590	13,000
Montana	1,540	6,240	–	–
Nebraska	6,370	39,800	–	–
Nevada	2,170	15,600	W	W
New Hampshire	W	W	–	–
New Jersey	W	W	–	–
New Mexico	1,350	6,090	–	–
New York	27,600 2/	136,000 2/	7,880	50,900
North Carolina	6,250	43,200	251	1,720
Ohio	48,200 2/	226,000 2/	15,400	63,900
Oklahoma	21,000	82,800	2,990	12,600
Oregon	W	W	–	–
Pennsylvania	55,200 2/	318,000 2/	10,800	66,900
Rhode Island	W	W	–	–
South Carolina	3,740	18,300	–	–
South Dakota	2,850	11,500	–	–
Tennessee	49,500	275,000	W	W
Texas	82,500	323,000	W	W
Utah	1,480 2/	8,500 2/	W	W
Vermont	2,260	8,440	W	W
Virginia	16,500 2/	94,600 2/	4,480	30,900
Washington	2,140 2/	21,900 2/	W	W
West Virginia	11,900	72,400	W	W
Wisconsin	20,800 2/	92,600 2/	263	1,400
Wyoming	1,620 2/	5,330 2/	–	–
Other	5,160 2/	31,100 2/	15,800	88,400
Total	869,000	4,390,000	86,000	447,000

W Withheld to avoid disclosing company proprietary data; included with "Other."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes limestone-dolomite reported with no distinction between the two kinds of stone.
3/ Data derived in part from the Alaska Division of Geological and Geophysical Surveys infor

TABLE 9
CRUSHED CALCAREOUS MARL AND MARBLE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY STATE 1/

(Thousand metric tons and thousand dollars)

State	Calcareous marl		Marble	
	Quantity	Value	Quantity	Value
Michigan	7	20	–	–
New York	–	–	80	1,380
Pennsylvania	–	–	464	2,860
Vermont	–	–	1,030	4,610
Wyoming	–	–	91	3,230
Other	3,630 2/	11,400 2/	4,420 3/	30,600 3/
Total	3,640	11,400	6,090	42,600

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes data for Florida, Mississippi, North Carolina, South Carolina, and Texas.
3/ Includes data for Alabama, Arizona, California, Georgia, Maryland, South Carolina, and Texas.

TABLE 10
CRUSHED GRANITE, TRAPROCK, AND SANDSTONE AND QUARTZITE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY STATE 1/

(Thousand metric tons and thousand dollars)

State	Granite		Traprock		Sandstone and quartzite	
	Quantity	Value	Quantity	Value	Quantity	Value
Alabama	W	W	–	–	–	–
Alaska 2/	W	W	888	3,300	–	–
Arizona	1,540	8,580	–	–	W	W
Arkansas	9,720	75,100	–	–	8,030	39,800
California	5,490	33,600	7,940	58,700	854	5,590
Colorado	5,590	39,500	204	W	W	W
Connecticut	144	1,110	4,580	W	W	W
Georgia	53,300	336,000	–	–	–	–
Hawaii	W	W	4,220	55,100	W	W
Idaho	549	3,060	1,680	6,150	W	W
Kansas	W	W	–	–	W	W
Kentucky	–	–	–	–	W	W
Louisiana	–	–	–	–	W	W
Maine	W	W	W	W	W	W
Maryland	4,880	29,500	W	W	196	1,110
Massachusetts	3,200	24,600	6,450	43,500	–	–
Michigan	W	W	–	–	7	120
Minnesota	W	W	W	W	944	W
Missouri	W	W	W	W	W	W
Montana	–	–	W	W	W	W
Nevada	W	W	W	W	–	–
New Hampshire	779	3,890	649	W	–	–
New Jersey	9,330	75,500	9,690	56,100	W	W
New Mexico	1,490	W	W	224	W	W
New York	3,560	19,200	W	W	1,740	8,830
North Carolina	42,400	289,000	4,500	31,300	W	W
Ohio	–	–	–	–	42	W
Oklahoma	W	W	W	W	W	W
Oregon	70	306	19,700	91,000	389	1,770
Pennsylvania	4,030	25,800	2,810	22,400	6,020	35,500
Rhode Island	948	6,680	W	W	–	–
South Carolina	17,700	119,000	–	–	–	–
South Dakota	1	7	–	–	2,790	17,200
Tennessee	W	W	–	–	W	W
Texas	W	W	W	W	746	W
Utah	W	W	–	–	113	W
Vermont	W	W	–	–	1,120	8,600
Virginia	24,000	138,000	12,500	71,900	W	W
Washington	257	1,310	11,000	49,000	W	3,290
West Virginia	–	–	–	–	851	5,970
Wisconsin	1,350	2,690	W	W	W	W
Wyoming	W	W	W	W	W	W
Other	11,700	80,300	7,710	83,900	13,600	92,900
Total	202,000	1,310,000	94,600	573,000	37,400	221,000

W Withheld to avoid disclosing company proprietary data; included with "Other."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Data derived, in part, from the Alaska Division of Geological and Geophysical Surveys information.

TABLE 11
CRUSHED VOLCANIC CINDER AND SCORIA AND CRUSHED MISCELLANEOUS STONE 1/ SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY STATE 2/

(Thousand metric tons and thousand dollars)

State	Volcanic cinder and scoria		Miscellaneous stone	
	Quantity	Value	Quantity	Value
Alabama	–	–	W	W
Alaska 3/	–	–	1,720	13,200
Arizona	238	W	W	W
Arkansas	–	–	35	W
California	420	3,450	6,490	43,900
Colorado	W	W	W	W
Connecticut	–	–	W	W
Florida	–	–	1,800	7,840
Hawaii	W	W	W	W
Idaho	–	–	W	W
Indiana	–	–	W	W
Louisiana	–	–	W	W
Maine	–	–	W	W
Massachusetts	–	–	W	W
Michigan	–	–	W	W
Mississippi	–	–	W	W
Montana	3	9	–	–
Nevada	W	W	W	W
New Jersey	–	–	W	W
New Mexico	283	2,170	W	1,350
New York	–	–	1,560	7,000
North Carolina	W	W	W	W
Oklahoma	–	–	W	W
Oregon	35	221	838	3,740
Pennsylvania	–	–	8,040	45,700
South Carolina	–	–	W	W
Tennessee	–	–	W	W
Texas	W	W	1,810	4,230
Utah	W	W	–	–
Vermont	–	–	W	W
Virginia	–	–	995	8,940
Washington	W	W	919	4,150
Wyoming	W	W	–	–
Other	1,070	7,570	8,820	47,500
Total	2,050	13,400	33,000	188,000

W Withheld to avoid disclosing company proprietary data; included with "Other."
1/ Includes marl, shell, slate, and other stone.
2/ Data are rounded to three significant digits; may not add to totals shown.
3/ Data derived, in part, from the Alaska Division of Geological and Geophysical Surveys information.

TABLE 12
KIND OF CRUSHED STONE PRODUCED IN THE UNITED STATES IN 1996, BY STATE

State	Lime-stone	Dolo-mite	Marble	Marl	Shell	Granite	Trap-rock	Sand-stone	Quartzite	Slate	Volcanic cinder and scoria	Miscella-neous
Alabama	X	X	X			X				X		
Alaska 1/	X					X	X			X		X
Arizona	X		X			X		X	X		X	X
Arkansas	X	X				X		X	X			X
California	X	X	X		X	X	X	X	X	X	X	X
Colorado	X					X	X	X	X		X	X
Connecticut	X	X				X	X		X			X
Florida	X	X		X	X							
Georgia	X		X			X						
Hawaii	X					X	X	X			X	X
Idaho	X					X	X		X			X
Illinois	X	X										
Indiana	X	X								X		
Iowa	X	X										
Kansas	X					X		X	X			
Kentucky	X							X				
Louisiana								X				X
Maine	X					X	X		X	X		X
Maryland	X		X			X	X	X				
Massachusetts	X					X	X					X
Michigan	X	X		X		X		X				X
Minnesota	X	X				X	X	X	X			
Mississippi	X			X								
Missouri	X	X				X	X	X	X			
Montana	X						X	X	X		X	
Nebraska	X											
Nevada	X	X				X	X				X	X
New Hampshire	X					X	X					
New Jersey	X					X	X	X				X
New Mexico	X					X	X		X		X	X
New York	X	X	X			X	X	X		X		X
North Carolina	X	X		X		X	X		X	X	X	X
Ohio	X	X						X				
Oklahoma	X	X			X	X	X	X		X		X
Oregon	X				X	X	X	X	X	X	X	X
Pennsylvania	X	X	X			X	X	X	X			X
Rhode Island	X					X	X					
South Carolina	X		X	X		X						
South Dakota	X					X			X			
Tennessee	X	X				X		X				X
Texas	X	X	X	X		X	X	X			X	X
Utah	X	X				X		X	X		X	
Vermont	X	X	X			X			X	X		
Virginia	X	X				X	X	X	X	X		X
Washington	X	X				X	X	X		X	X	X
West Virginia	X	X						X				
Wisconsin	X	X				X	X	X	X			
Wyoming	X		X			X	X		X		X	

1/ Data derived, in part, from the Alaska Division of Geological and Geophysical Surveys.

TABLE 13
CRUSHED STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY USE 1/

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Coarse aggregate (+1 1/2 inch):			
Macadam	4,160	$24,400	$5.86
Riprap and jetty stone	17,500	109,000	6.21
Filter stone	7,280	43,000	5.91
Other coarse aggregate	5,890	34,800	5.91
Coarse aggregate, graded:			
Concrete aggregate, coarse	99,000	578,000	5.84
Bituminous aggregate, coarse	88,900	516,000	5.81
Bituminous surface-treatment aggregate	22,900	147,000	6.40
Railroad ballast	13,000	78,700	6.04
Other graded coarse agggregate	26,100	173,000	6.64
Fine aggregate (-3/8 inch):			
Stone sand, concrete	20,100	128,000	6.38
Stone sand, bituminous mix or seal	25,500	140,000	5.47
Screening, undesignated	22,700	112,000	4.92
Other fine aggregate	5,330	31,000	5.82
Coarse and fine aggregates:			
Graded road base or subbase	176,000	802,000	4.56
Unpaved road surfacing	34,100	161,000	4.73
Terrazzo and exposed aggregate	2,680	19,900	7.43
Crusher run or fill or waste	44,400	213,000	4.80
Other coarse and fine aggregates	21,900	113,000	5.16
Roofing granules	2,450	31,600	12.93
Other construction materials 2/	8,120	45,200	5.57
Agricultural:			
Agricultural limestone	12,300	69,600	5.64
Poultry grit and mineral food	1,320	13,300	10.12
Other agricultural uses	986	6,840	6.94
Chemical and metallurgical:			
Cement manufacture	83,500	309,000	3.70
Lime manufacture	13,600	67,700	4.98
Dead-burned dolomite manufacture	691	4,540	6.58
Flux stone	6,230	34,600	5.55
Chemical stone	765	4,070	5.33
Glass manufacture	450	4,800	10.66
Sulfur oxide removal	2,750	13,800	5.03
Special:			
Mine dusting or acid water treatment	412	7,800	18.92
Asphalt fillers or extenders	1,280	10,500	8.20
Whiting or whiting substitute	801	22,100	27.56
Other fillers or extenders	3,450	84,100	24.41
Other miscellaneous uses:			
Light weight aggregate (slate)	669	7,080	10.58
Other specified uses not listed 3/	1,630	21,000	12.92
Unspecified: 4/			
Actual	370,000	2,090,000	5.65
Estimated	182,000	913,000	5.02
Total	1,330,000	7,180,000	5.40

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Includes building products, drain fields, pipe bedding and waste material.
3/ Includes flour (slate), paper manufacture, and sugar refining.
4/ Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 14
CRUSHED LIMESTONE 1/ AND DOLOMITE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY USE 2/

(Thousand metric tons and thousand dollars)

Use	Limestone		Dolomite	
	Quantity	Value	Quantity	Value
Coarse aggregate (+1 1/2 inch):				
Macadam	3,190	18,300	346	2,120
Riprap and jetty stone	10,700	57,500	999	6,020
Filter stone	4,330	22,500	174	1,040
Other coarse aggregate	3,930	21,600	398	2,470
Coarse aggregate, graded:				
Concrete aggregate, coarse	67,000	363,000	8,970	46,900
Bituminous aggregate, coarse	59,000	325,000	7,760	41,700
Bituminous aggregate, fine	12,800	70,900	2,050	12,300
Railroad ballast	2,830	15,200	1,340	6,060
Other graded coarse aggregate	15,200	90,500	3,060	18,800
Fine aggregate (-3/8 inch):				
Stone sand, concrete	13,500	80,100	832	5,790
Stone sand, bituminous mix or seal	13,700	71,200	2,930	16,500
Screening, undesignated	13,600	61,400	1,580	9,780
Other fine aggregate	4,110	23,600	313	1,500
Coarse and fine aggregates:				
Graded road base or subbase	117,000	493,000	13,400	59,500
Unpaved road surfacing	20,700	100,000	5,810	27,400
Terrazzo and exposed aggregate	1,370	7,490	40	313
Crusher run or fill or waste	24,700	110,000	2,810	11,700
Other coarse and fine aggregates	14,700	67,000	773	4,330
Roofing granules	223	1,360	(3/)	(3/)
Other construction materials	5,020 4/	26,400 4/	416 5/	2,420 5/
Agricultural:				
Agricultural limestone	10,600	57,100	1,750	12,500
Poultry grit and mineral food	1,120	11,800	W	W
Other agricultural uses	567	3,430	201	2,220
Chemical and metallurgical:				
Cement manufacture	80,800	301,000	W	W
Lime manufacture	12,200	59,500	1,310	7,180
Dead-burned dolomite manufacture	502	3,650	W	W
Flux stone	4,590	26,900	1,330	4,380
Chemical stone	765	4,070	--	--
Glass manufacture	W	W	W	W
Sulfur oxide removal	2,730	13,800	12	39
Special:				
Mine dusting or acid water treatment	387	7,120	W	W
Asphalt fillers or extenders	1,000	7,850	W	W
Whiting or whiting substitute	784	21,500	W	W
Other fillers or extenders	2,640	74,100	363	6,190
Other specified uses not listed	878 6/	15,200 6/	1,240	10,200
Unspecified: 7/				
Actual	214,000	1,120,000	20,600	104,000
Estimated	128,000	637,000	5,170	24,100
Total	869,000	4,390,000	86,000	447,000

W Withheld to avoid disclosing company proprietary data; included with "Other specified uses not listed."
1/ Includes a minor amount of limestone-dolomite reported without a distinction between the two.
2/ Data are rounded to three significant digits; may not add to totals shown.
3/ Included with "Other construction materials."
4/ Includes building products, drain fields, pipe bedding, and waste material.
5/ Includes drain fields and waste material.
6/ Includes paper manufacture and sugar refining.
7/ Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 15
CRUSHED LIMESTONE 1/ AND DOLOMITE SOLD OR USED BY PRODUCERS
IN 1996, BY STATE AND USE 2/

(Thousand metric tons and thousand dollars)

State	Concrete aggregate		Bituminous aggregate		Roadstone and coverings		Riprap and railroad ballast		Other construction uses	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Alabama	3,470	16,400	6,510	32,100	3,570	16,500	452	2,220	3,750	18,500
Alaska	–	–	–	–	–	–	–	–	–	–
Arizona	–	–	–	–	W	W	–	–	W	W
Arkansas	618	3,240	379	2,040	1,970	9,880	131	791	777	3,790
California	2,010	12,000	1,530	10,900	1,170	5,680	305	2,540	378	1,090
Colorado	W	W	–	–	–	–	–	–	–	–
Connecticut	W	W	W	W	W	W	–	–	W	W
Florida	19,600	136,000	9,710	62,500	16,000	63,000	256	1,380	9,470	33,700
Georgia	1,120	7,170	1,790	12,300	700	4,100	92	734	1,020	6,200
Hawaii	W	W	–	–	W	W	–	–	11	206
Idaho	–	–	–	–	–	–	–	–	–	–
Illinois	7,340	39,800	7,160	43,100	13,800	63,000	1,120	7,200	2,890	14,000
Indiana	5,640	21,600	7,450	25,700	8,290	39,500	1,560	7,060	2,110	9,410
Iowa	1,150	6,360	663	3,880	5,390	26,500	201	1,440	498	1,960
Kansas	1,000	6,730	1,030	6,470	2,400	11,400	113	813	2,450	12,300
Kentucky	3,850	18,600	8,190	40,300	7,220	32,100	768	3,960	2,780	13,900
Maine	145	W	W	W	–	–	W	W	W	W
Maryland	365	2,320	548	3,300	W	W	175	1,140	2,190	8,640
Massachusetts	–	–	W	W	W	W	W	W	246	3,170
Michigan	1,910	6,100	1,500	6,940	2,810	11,500	195	1,520	563	2,040
Minnesota	585	3,880	W	W	2,680	11,700	192	1,310	634	3,750
Mississippi	–	–	W	W	–	–	–	–	W	W
Missouri	3,560	20,300	6,220	44,400	11,800	49,600	2,950	10,300	2,170	8,820
Montana	W	W	–	–	W	W	–	W	W	W
Nebraska	842	6,130	416	2,190	424	3,270	135	1,280	528	3,670
Nevada	W	W	112	W	W	W	–	W	W	W
New Hampshire	W	W	–	–	–	–	W	W	–	–
New Jersey	–	–	–	–	–	–	–	–	–	–
New Mexico	W	W	23	66	111	474	W	W	35	155
New York	2,620	18,300	6,640	46,000	4,890	31,000	414	2,770	4,400	22,800
North Carolina	103	691	W	W	188	1,060	33	254	244	1,500
Ohio	5,710	23,400	4,580	20,000	16,900	69,500	1,110	4,680	2,180	11,300
Oklahoma	2,390	11,800	457	2,640	1,650	5,720	89	538	2,420	8,470
Oregon	–	–	–	–	–	–	–	–	–	–
Pennsylvania	4,780	28,100	14,000	83,600	11,600	61,800	1,270	8,860	7,410	39,100
Rhode Island	–	–	–	–	–	–	–	–	–	W
South Carolina	–	–	–	–	W	W	–	–	–	–
South Dakota	W	W	W	W	W	W	W	W	W	W
Tennessee	2,630	16,400	12,700	72,900	12,300	63,500	1,580	8,190	6,520	34,800
Texas	15,300	67,300	14,000	69,500	21,700	66,400	819	4,460	6,890	26,900
Utah	–	–	W	W	796	2,380	W	W	W	W
Vermont	–	–	–	–	–	–	–	–	–	–
Virginia	2,530	15,900	3,100	18,900	3,690	18,100	635	4,330	2,920	14,600
Washington	–	–	–	–	–	–	W	W	W	W
West Virginia	667	3,970	1,240	6,930	599	3,330	456	2,380	1,340	6,760
Wisconsin	1,400	7,260	670	3,420	8,120	34,200	135	777	1,250	4,730
Wyoming	W	W	W	W	W	W	W	W	W	W
Total	91,300	500,000	111,000	620,000	161,000	705,000	15,200	80,900	68,100	316,000
Total withheld	1,220	10,200	2,930	14,000	3,330	13,300	223	1,350	1,590	11,100
Grand total	92,500	510,000	114,000	634,000	164,000	718,000	15,400	82,300	69,700	327,000

See footnotes at end of table.

TABLE 15--Continued
CRUSHED LIMESTONE 1/ AND DOLOMITE SOLD OR USED BY PRODUCERS
IN 1996, BY STATE AND USE 2/

(Thousand metric tons and thousand dollars)

State	Cement manufacture		Agricultural uses		Lime manufacture		Other uses		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Alabama	W	W	190	1,330	320	W	16,500	89,000	34,800	176,000
Alaska	–	–	–	–	–	–	W	W	W	W
Arizona	W	W	W	W	W	W	4,110	23,000	4,110	23,000
Arkansas	W	W	166	965	W	W	3,220	16,000	7,260	36,700
California	11,400	42,100	118	1,810	–	–	8,440	71,600	25,300	148,000
Colorado	1,160	5,320	–	–	–	–	1,680	9,880	2,840	15,200
Connecticut	–	–	W	W	–	–	W	W	W	W
Florida	3,220	9,160	463	2,220	–	–	12,300	71,300	71,000	379,000
Georgia	W	W	13	92	–	–	5,390	34,900	10,100	65,600
Hawaii	162	1,440	W	W	–	–	855	8,860	1,030	10,500
Idaho	W	W	632	1,830	W	W	732	6,100	1,370	7,920
Illinois	2,360	9,080	2,580	12,600	–	–	29,300	175,000	66,500	364,000
Indiana	3,530	9,270	1,510	7,840	W	W	23,600	134,000	53,700	254,000
Iowa	3,070	22,900	672	2,890	–	–	22,800	136,000	34,400	202,000
Kansas	1,940	7,710	216	939	–	–	12,300	61,600	21,400	108,000
Kentucky	W	W	974	4,170	W	W	34,700	130,000	58,500	243,000
Maine	W	W	8	W	W	W	W	7,410	1,410	7,410
Maryland	W	W	–	W	–	–	14,100	96,000	17,400	111,000
Massachusetts	–	–	W	W	W	W	1,890	20,300	2,140	23,500
Michigan	4,430	20,800	111	779	W	W	27,100	94,000	38,600	144,000
Minnesota	–	–	199	1,070	W	W	4,720	20,600	9,010	42,300
Mississippi	–	–	W	W	–	–	W	W	W	W
Missouri	8,510	27,900	1,250	5,970	1,200	5,120	28,200	145,000	65,900	318,000
Montana	W	W	–	–	–	–	1,540	6,240	1,540	6,240
Nebraska	W	W	316	2,740	–	–	3,710	20,500	6,370	39,800
Nevada	–	–	W	W	W	W	2,170	15,600	2,170	15,600
New Hampshire	–	–	–	–	–	–	W	W	W	W
New Jersey	–	–	–	–	–	–	W	W	W	W
New Mexico	W	W	–	–	–	–	1,190	5,390	1,350	6,090
New York	3,810	15,000	80	705	–	–	12,600	50,500	35,500	187,000
North Carolina	–	–	W	W	–	–	5,930	41,400	6,500	44,900
Ohio	W	W	1,110	6,370	324	W	31,700	155,000	63,600	290,000
Oklahoma	W	W	138	527	–	–	16,800	65,700	24,000	95,400
Oregon	W	W	–	–	–	–	W	W	W	W
Pennsylvania	6,080	29,000	627	6,040	1,250	8,940	18,900	120,000	66,000	385,000
Rhode Island	–	–	W	W	–	–	W	W	W	W
South Carolina	–	–	–	–	–	–	3,740	18,300	3,740	18,300
South Dakota	982	W	–	–	W	W	W	W	2,850	11,500
Tennessee	W	W	583	4,780	W	W	13,200	74,100	49,500	275,000
Texas	8,830	21,200	505	3,260	1,000	5,000	13,500	59,100	82,500	323,000
Utah	W	W	W	W	W	W	1,480	8,500	1,480	8,500
Vermont	–	–	–	–	–	–	2,260	8,440	2,260	8,440
Virginia	W	W	774	8,180	796	4,280	6,550	41,300	21,000	126,000
Washington	W	W	W	W	W	W	2,140	21,900	2,140	21,900
West Virginia	1,120	W	8	67	–	–	6,440	49,000	11,900	72,400
Wisconsin	–	–	387	4,100	W	W	9,150	39,500	21,100	94,000
Wyoming	–	–	–	–	–	–	1,620	5,330	1,620	5,330
Total	60,600	221,000	13,600	81,300	4,890	23,300	407,000	2,160,000	934,000	4,710,000
Total withheld	20,300	80,700	209	3,180	9,280	47,700	8,500	47,800	21,000	120,000
Grand total	80,900	302,000	13,800	84,500	14,200	71,000	XX	XX	955,000	4,830,000

W Withheld to avoid disclosing company proprietary data; included in "Total withheld." XX Not applicable.
1/ Includes a minor amount of limestone-dolomite reported without a distinction between the two.
2/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 16
CRUSHED MARBLE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY USE 1/

(Thousand metric tons and thousand dollars)

Use	Quantity	Value
Coarse aggregate (+1-1/2-inch): Other coarse aggregate	8	137
Coarse aggregate, graded:		
Concrete aggregate, coarse	174	1,390
Bituminous aggregate, coarse	147	979
Bituminous surface-treatment aggregate	95	693
Fine aggregate (-3/8-inch): Screening, undesignated	8	39
Coarse and fine aggregates:		
Graded road base or subbase	439	2,400
Terrazzo and exposed aggregate	42	1,400
Roofing granules	(2/)	2
Other construction materials 3/	616	4,410
Chemical and metallurgical: Lime manufacture	46	1,020
Special:		
Other fillers or extenders	41	1,650
Other specified uses not listed 4/	166	1,090
Unspecified: 5/		
Actual	2,240	15,700
Estimated	2,060	11,700
Total	6,090	42,600

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.
3/ Includes crusher run (select material or fill), filter stone, other coarse and fine aggregates, other fine aggregate, other graded coarse aggregate, riprap and jetty stone, stone sand (bituminous mix or seal), and unpaved road surfacing.
4/ Includes mine dusting or acid-water treatment, other agricultural uses, and whiting or whiting substitute.
5/ Includes production reported without a breakdown by end use and estimates for respondents.

TABLE 17
CRUSHED GRANITE AND TRAPROCK SOLD OR USED BY PRODUCERS
IN THE UNITED STATES IN 1996, BY USE 1/

(Thousand metric tons and thousand dollars)

Use	Granite		Traprock	
	Quantity	Value	Quantity	Value
Coarse aggregate (+1-1/2-inch):				
Macadam	57	300	223	1,420
Riprap and jetty stone	2,790	24,600	2,040	14,400
Filter stone	1,200	9,090	1,310	8,430
Other coarse aggregate	751	5,080	611	4,400
Coarse aggregate, graded:				
Concrete aggregate, coarse	13,600	97,300	7,080	57,900
Bituminous aggregate, coarse	10,900	79,200	7,840	49,300
Bituminous surface-treatment aggregate	3,270	25,800	3,240	26,300
Railroad ballast	5,910	37,500	2,850	19,400
Other graded coarse aggregate	6,360	52,700	909	6,930
Fine aggregate (-3/8-inch):				
Stone sand, concrete	3,840	24,800	1,130	12,400
Stone sand, bituminous mix or seal	6,580	36,800	1,340	8,950
Screening, undesignated	3,880	22,000	2,450	13,200
Other fine aggregate	519	3,740	25	246
Coarse and fine aggregates:				
Graded road base or subbase	20,800	122,000	16,300	85,100
Unpaved road surfacing	1,620	5,920	3,960	16,500
Terrazzo and exposed aggregate	613	4,240	(2/)	(2/)
Crusher run or fill or waste	11,600	68,900	3,960	16,500
Other coarse and fine aggregates	1,570	10,000	4,030	25,400
Roofing granules	942	10,300	1,270	19,900
Other construction materials	207	876	1,590 3/	10,300 3/
Other specified uses not listed 4/	601 5/	3,920 5/	(6/)	5
Unspecified: 7/				
Actual	90,000	595,000	15,200	84,800
Estimated	14,400	72,400	17,200	90,500
Total	202,000	1,310,000	94,600	573,000

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Included with "Other construction materials."
3/ Includes drain fields and building products.
4/ Includes other agricultural uses.
5/ Includes other fillers or extenders.
6/ Less than 1/2 unit.
7/ Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 18
CRUSHED SANDSTONE AND QUARTZITE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY USE 1/

(Thousand metric tons and thousand dollars)

Use	Sandstone		Quartzite	
	Quantity	Value	Quantity	Value
Coarse aggregate (+1-1/2-inch):				
Macadam	165	1,040	45	248
Riprap and jetty stone	659	3,920	200	1,160
Filter stone	80	595	53	369
Other coarse aggregate	67	520	W	W
Coarse aggregate, graded:				
Concrete aggregate, coarse	938	5,310	602	3,230
Bituminous aggregate, coarse	1,540	10,900	738	4,330
Bituminous surface-treatment aggregate	408	3,150	290	2,280
Railroad ballast	40	248	46	336
Other graded coarse aggregate	W	W	–	–
Fine aggregate (-3/8-inch):				
Stone sand, concrete	642	3,950	122	965
Stone sand, bituminous mix or seal	552	3,330	201	1,430
Screening, undesignated	412	2,000	396	1,000
Other fine aggregate	336	1,710	–	–
Coarse and fine aggregates:				
Graded road base or subbase	3,870	20,100	814	4,660
Unpaved road surfaces	502	3,040	487	2,660
Terrazzo and exposed aggregate	W	W	W	W
Crusher run or fill or waste	555	2,720	140	803
Other coarse and fine aggregates	156	843	343	3,090
Other construction materials	309	3,130	51	347
Agricultural: Poultry grit and mineral food	(2/)	(2/)	(3/)	(3/)
Chemical and metallurgical:				
Cement manufacture	315	1,260	95	713
Flux stone	9	48	303	3,270
Glass manufacture	–	–	(3/)	(3/)
Special:				
Other fillers or extenders	(2/)	(2/)	–	–
Other specified uses not listed	–	–	99	1,350
Unspecified: 4/				
Actual	10,300	62,500	3,770	21,900
Estimated	5,720	30,200	916	4,740
Total	27,700	162,000	9,720	58,900

W Withheld to avoid disclosing company proprietary data; included with "Other construction materials."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Withheld to avoid disclosing company proprietary data; included in "Total."
3/ Included with "Other specified uses not listed."
4/ Includes production reported without breakdown by end use and estimates for nonrespondents.

TABLE 19
CRUSHED VOLCANIC CINDER AND SCORIA AND CRUSHED MISCELLANEOUS STONE 1/
SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996, BY USE 2/

(Thousand metric tons and thousand dollars)

Use	Volcanic cinder and scoria		Miscellaneous stone	
	Quantity	Value	Quantity	Value
Coarse aggregate (+1-1/2-inch):				
Macadam	–	–	W	W
Riprap and jetty stone	W	W	76	745
Filter stone	W	W	102	777
Other coarse aggregate	–	–	115	549
Course aggregate, graded:				
Concrete aggregate, coarse	W	W	581	3,450
Bituminous aggregate, coarse	–	–	925	5,050
Bituminous surface-treatment aggregate	–	–	777	5,200
Railroad ballast	–	–	W	W
Other graded coarse aggregate	W	W	191	1,190
Fine aggregate (-3/8-inch):				
Stone sand, concrete	–	–	W	W
Stone sand, bituminous mix or seal	–	–	213	1,250
Screening, undesignated	54	391	345	1,760
Other fine aggregate	–	–	W	W
Coarse and fine aggregates:				
Graded road base or subbase	398	2,250	2,890	12,500
Unpaved road surfacing	124	201	867	5,200
Terrazzo and exposed aggregate	297	3,140	W	W
Crusher run or fill or waste	W	W	364	1,550
Other coarse and fine aggregates	–	–	145	1,020
Other construction materials	307 3/	1,420 3/	1,010	6,840
Agricultural:				
Poultry grit and mineral food	–	–	(4/)	(4/)
Other agricultural uses	–	–	(4/)	(4/)
Chemical and metallurgical: Cement manufacture	–	–	2,180	5,130
Special: Other fillers or extenders	–	–	(4/)	(4/)
Other miscellaneous uses:				
Light weight aggregate (slate)	–	–	669	7,080
Flour (slate)	–	–	(4/)	(4/)
Other specified uses not listed	68	774	260	1,970
Unspecified: 5/				
Actual	649	4,370	12,800	84,900
Estimated	155	875	8,550	42,100
Total	2,050	13,400	33,000	188,000

W Withheld to avoid disclosing company proprietary data; included with "Other construction materials."
1/ Includes marl, shell, slate, and other stone.
2/ Data are rounded to three significant digits; may not add to totals shown.
3/ Includes roofing granules.
4/ Included with "Other specified uses not listed."
5/ Includes production reported without a breakdown by end use and estimates for nonrespondents.

TABLE 20
RECYCLED ASPHALT AND CONCRETE SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY REGION 1/

Region/Division	Recycled asphalt						Recycled concrete					
	1995			1996			1995			1996		
	Quantity (thousand metric tons)	Value (thousands)	Unit value	Quantity (thousand metric tons)	Value (thousands)	Unit value	Quantity (thousand metric tons)	Value (thousands)	Unit value	Quantity (thousand metric tons)	Value (thousands)	Unit value
Northeast:												
New England	258	$1,660 r/	$6.44 r/	528	$3,150	$5.97	42 r/	$261 r/	$7.16	63	$346	$5.31
Middle Atlantic	296 r/	2,120 r/	7.15 r/	271	2,360	8.71	193	988	5.12	420	2,280	5.42
Midwest:												
East North Central	89	606	6.81	136	668	4.91	38	135	3.55	23	90	3.91
West North Central	205	919	4.48	119	728	6.12	132	600	4.55	W	W	3.76
South:												
South Atlantic	20	65	3.25	23	124	5.39	W	W	5.86	W	W	5.81
East South Central	W	W	6.67	W	W	4.26	–	–	–	–	–	–
West South Central	576	2,370	5.85	W	W	7.05	W	W	5.56	–	–	–
West:												
Mountain	W	W	2.78 r/	105	547	5.21	W	W	1.00 r/	30	94	3.13
Pacific	84	339	4.04	103	673	6.53	390	1,780	4.55	436	2,460	5.64
Total	1,580	8,280 r/	5.25 r/	1,350	8,630	6.41	912 r/	4,410 r/	4.84 r/	1,170	6,280	5.37

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 21
RECYCLED ASPHALT SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY STATE 1/

State	1995 Quantity (thousand metric tons)	1995 Value (thousands)	1995 Unit value	1996 Quantity (thousand metric tons)	1996 Value (thousands)	1996 Unit value
Alabama	–	–	–	W	W	$2.75
Alaska	–	–	–	15	$136	9.07
Arizona	11	$22	$2.00	–	–	–
California	61	198	3.25	62	193	3.11
Colorado	W	W	3.56	W	W	3.67
Connecticut	–	–	–	W	W	5.55
Florida	W	W	4.00	W	W	4.57
Hawaii	–	–	–	W	W	7.40
Idaho	–	–	–	6	18	3.00
Illinois	17	71	4.18	–	–	–
Indiana	14	W	W	W	W	5.33
Iowa	W	W	1.06 r/	2	8	–
Kansas	W	W	3.29	W	W	4.75
Louisiana	9	71	7.89	W	W	16.67
Maine	4	W	W	44	296	6.73
Massachusetts	148	953	6.44	338	1,990	5.90
Minnesota	83	470	5.66	89	586	6.58
Missouri	W	W	6.40	W	W	4.10
Nevada	–	–	–	18	43	2.39
New Hampshire	W	W	7.35 r/	W	W	6.39
New Jersey	172	1,580	9.20	W	W	9.85
New Mexico	W	W	1.00 r/	–	–	–
New York	21	116	5.52	38	211	5.55
Ohio	–	–	–	W	W	6.80
Oregon	20	124	6.20	18	300	16.67
Pennsylvania	103 r/	418 r/	4.06 r/	48	317	6.60
Rhode Island	W	W	6.11	W	W	5.28
South Dakota	32	175	5.47	–	–	–
Tennessee	W	W	6.67	W	W	4.26
Texas	W	W	4.05	W	W	4.26
Utah	–	–	–	W	W	6.56
Vermont	–	–	–	W	W	1.00
Virginia	W	W	1.00	W	W	6.67
Washington	W	W	6.00	W	W	2.33
Wisconsin	59	355	6.02	37	139	3.76
Total	1,580	8,280 r/	5.25 r/	1,350	8,630	6.41

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits; may not add to totals shown.

TABLE 22
RECYCLED CONCRETE SOLD OR USED BY PRODUCERS IN THE UNITED STATES, BY STATE 1/

State	1995 Quantity (thousand metric tons)	1995 Value (thousands)	1995 Unit value	1996 Quantity (thousand metric tons)	1996 Value (thousands)	1996 Unit value
Alaska	W	W	$4.40	1	$10	$10.00
California	73	$248	3.40	269	1,530	5.70
Hawaii	W	W	2.17	–	–	–
Idaho	–	–	–	W	W	3.50
Illinois	20	89	4.45	–	–	–
Iowa	W	W	6.41	–	–	–
Maine	31	147	2.14	W	W	2.57
Massachusetts	W	W	10.36 r/	57	328	5.56
Minnesota	W	W	4.37	W	W	3.76
Nevada	–	–	–	6	15	2.50
New Jersey	111	594	5.35	W	W	5.83
New Mexico	W	W	1.00 r/	W	W	4.00
New York	W	W	4.76	W	W	4.49
Oregon	(2/)	1	3.94 r/	W	W	5.41
Pennsylvania	W	W	4.00	3	15	4.00
South Dakota	96	408	4.25	–	–	–
Texas	W	W	5.56	–	–	–
Utah	–	–	–	W	W	2.00
Virginia	W	W	5.86	W	W	5.81
Washington	W	W	4.93	W	W	5.49
Wisconsin	W	W	2.56	23	90	3.91
Total	912 r/	4,410 r/	4.84 r/	1,170	6,280	5.37

r/ Revised. W Withheld to avoid disclosing company proprietary data; included in "Total."
1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

TABLE 23
CRUSHED STONE SOLD OR USED BY PRODUCERS IN THE UNITED STATES IN 1996,
BY REGION AND METHOD OF TRANSPORTATION 1/

(Thousand metric tons)

Region/Division	Truck	Rail	Water	Other	Not transported	Not specified	Total
Northeast:							
New England	9,500	423	(2/)	(2/)	3,260	15,600	28,800
Middle Atlantic	82,600	3,350	2,420	2,330	9,570	52,100	152,000
Midwest:							
East North Central	103,000	6,330	18,500	2,680	11,100	107,000	249,000
West North Central	46,600	3,690	6,550	1,670	11,000	78,100	148,000
South:							
South Atlantic	144,000	19,800	1,860	1,390	12,200	140,000	319,000
East South Central	75,900	2,530	1,620	1,120	8,260	65,900	155,000
West South Central	64,900	19,000	(2/)	4,740	7,610	48,800	145,000
West:							
Mountain	15,000	1,820	(2/)	(2/)	3,590	18,600	39,100
Pacific	29,900	2,280	1,390	6,370	4,690	48,900	93,500
Total	572,000	59,200	32,400	20,300	71,400	575,000	1,330,000

1/ Data are rounded to three significant digits; may not add to totals shown.
2/ Less than 1/2 unit.

TABLE 24
NUMBER OF CRUSHED AND BROKEN STONE OPERATIONS AND PROCESSING PLANTS IN THE UNITED STATES IN 1996, BY STATE

State	Mining operations on land				Dredging operations	Total active operations
	Stationary	Portable	Stationary and portable	No. plants or unspecified		
Alabama	46	4	–	2	–	52
Alaska 1/	2	7	2	3	–	14
Arizona	15	10	1	3	1	30
Arkansas	30	10	6	6	–	52
California	52	23	14	10	1	100
Colorado	10	6	8	3	–	27
Connecticut	17	5	1	–	1	24
Florida	33	29	6	7	3	78
Georgia	73	3	1	1	–	78
Hawaii	10	9	5	3	–	27
Idaho	8	26	4	2	–	40
Illinois	74	53	16	1	–	144
Indiana	72	3	7	3	–	85
Iowa	22	170	2	5	–	199
Kansas	19	83	6	2	–	110
Kentucky	77	8	5	3	–	93
Louisiana	1	1	–	1	11	14
Maine	6	8	1	–	–	15
Maryland	20	7	1	1	–	29
Massachusetts	23	6	3	3	–	35
Michigan	17	9	3	3	–	32
Minnesota	8	31	1	6	–	46
Mississippi	3	1	1	–	–	5
Missouri	96	91	14	10	–	211
Montana	9	4	–	1	–	14
Nebraska	5	3	3	–	–	11
Nevada	10	4	1	–	–	15
New Hampshire	6	3	1	2	–	12
New Jersey	10	1	10	–	–	21
New Mexico	13	15	2	1	–	31
New York	67	13	18	3	–	101
North Carolina	85	8	5	2	–	100
Ohio	82	19	7	2	1	111
Oklahoma	45	8	8	1	–	62
Oregon	26	89	7	15	2	139
Pennsylvania	146	25	20	14	–	205
Rhode Island	7	1	–	–	–	8
South Carolina	30	1	2	1	–	34
South Dakota	8	2	–	–	–	10
Tennessee	101	9	3	3	–	116
Texas	69	46	15	3	–	133
Utah	8	5	4	1	–	18
Vermont	7	4	3	3	–	17
Virginia	92	5	7	–	–	104
Washington	29	53	10	24	–	116
West Virginia	34	7	4	1	–	46
Wisconsin	21	104	5	13	–	143
Wyoming	6	3	1	–	–	10
Total	1,650	1,035	244	168	20	3,117

1/ Data derived, in part, from the Alaska Division of Geological and Geophysical Surveys.

TABLE 25
U.S. EXPORTS OF CRUSHED STONE IN 1996, BY DESTINATION 1/

(Metric tons)

Destination	Limestone for cement manufacturing	Other	Chalk, crude	Granules, chippings	Total
North America:					
Bahamas, The	190	–	–	–	190
Barbados	–	–	18	14	32
Canada	2,410,000	968	4,040	189,000	2,610,000
Cayman Islands	–	–	–	57	57
Costa Rica	1	–	1	–	2
Jamaica	4,660	–	–	1	4,660
Mexico	1,460	469	124	3,150	5,200
Netherlands Antilles	–	–	–	3,700	3,700
Panama	–	–	33	–	33
Trinidad and Tobago	26,100	–	–	–	26,100
Total	2,450,000	1,440	4,220	196,000	2,650,000
South America:					
Argentina	588	–	–	–	588
Brazil	14,300	–	–	501	14,800
Chile	37	–	–	10	47
Colombia	1,600	1	5	–	1,610
Ecuador	800	37	–	20	857
Peru	200	–	–	–	200
Suriname	21,000	–	–	–	21,000
Venezuela	1,500	–	49	6,560	8,110
Total	40,000	38	53	7,090	47,200
Europe:					
Austria	1,600	–	–	16	1,620
Belgium	54,500	–	4	47	54,500
Denmark	420	–	–	–	420
France	44,100	21	12	5	44,100
Germany	75,200	3,080	154	817	79,300
Greece	700	–	–	–	700
Hungary	3,200	–	–	–	3,200
Iceland	51	–	–	–	51
Ireland	1,460	606	–	–	2,070
Italy	42,100	–	–	140	42,200
Netherlands	2,460	239	–	7,330	10,000
Portugal	–	–	–	3	3
Slovenia	1	–	–	–	1
Spain	680	–	–	–	680
Sweden	8,860	–	–	–	8,860
Switzerland	2,780	–	–	–	2,780
United Kingdom	62,400	325	10	462	63,200
Total	300,000	4,270	181	8,820	314,000
Asia:					
China	8,880	–	–	8,020	16,900
Hong Kong	114	60	–	137	311
India	–	22	–	–	22
Indonesia	6,480	14	–	–	6,490
Japan	173,000	1,680	1	173	175,000
Korea, Republic of	3,520	116	–	34	3,670
Malaysia	1,050	–	–	87	1,140
Singapore	–	209	–	4	213
Taiwan	40,700	36	1	56	40,800
Thailand	700	–	–	–	700
Total	235,000	2,130	2	8,510	246,000

See footnotes at end of table.

TABLE 25–Continued
U.S. EXPORTS OF CRUSHED STONE IN 1996, BY DESTINATION 1/

(Metric tons)

Destination	Limestone for cement manufacturing	Other	Chalk, crude	Granules, chippings	Total
Oceania:					
Australia	6,330	37	104	–	6,470
Other	–	–	–	190	190
Total	6,330	37	104	190	6,660
Middle East:					
Israel	–	–	1,930	–	1,930
Lebanon	–	–	–	–	–
Qatar	–	–	–	502	502
Saudi Arabia	–	–	–	1,220	1,220
Total	–	–	1,930	1,720	3,650
Africa:					
Egypt	72	–	–	–	72
South Africa	38	–	–	–	38
Total	110	–	–	–	110
Grand total	3,030,000	7,920	6,490	223,000	3,270,000
Total value (thousands)	$20,500	$5,940	$2	$9,900	$36,300

1/ Data are rounded to three significant digits; may not add to totals shown.

Source: U.S. Bureau of the Census.

TABLE 26
U.S. IMPORTS OF CRUSHED STONE AND CALCIUM CARBONATE FINES, BY TYPE 1/

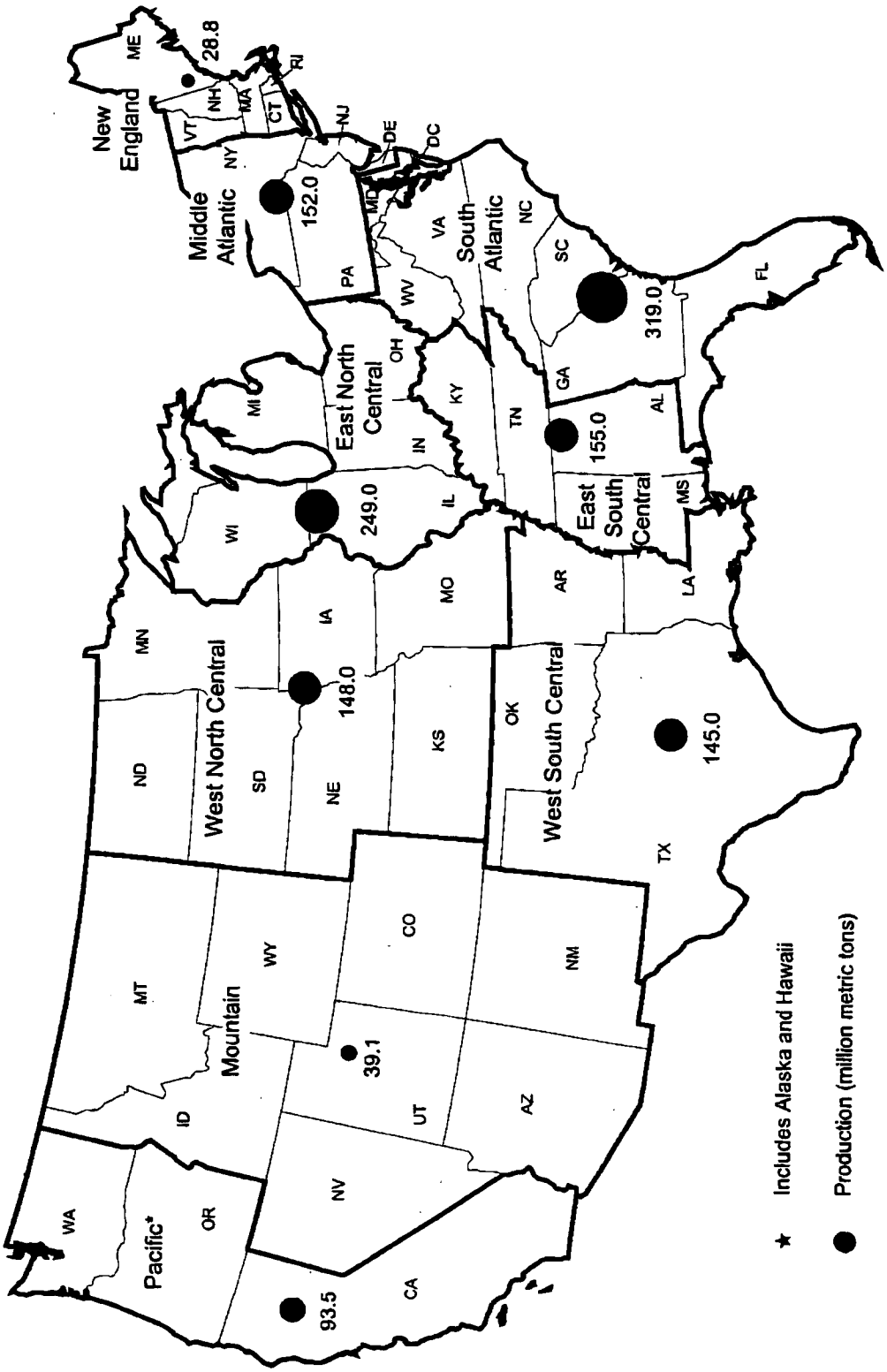
(Thousand metric tons and thousand dollars)

Type	1995 Quantity	1995 C.i.f. value 2/	1996 Quantity	1996 C.i.f. value 2/	Unit price
Crushed stone and chips:					
Limestone 2/	6,400	52,600	7,150	58,300	$8.15
Limestone for flux or cement manufacturing	3,240	24,600	3,480	23,800	6.83
Quartzite	(3/)	390	(3/)	524	1,168
Other	1,200	12,600	664	7,000	10.55
Total	10,800	90,300	11,300	89,600	XX
Calcium carbonate fines: 4/					
Natural chalk	(3/)	7	(3/)	1,260	XX
Calcium carbonates other chalk	7	1,600	3	914	304.67
Total	7	1,610	3	2,170	XX
Grand total	10,900	91,900	11,300	91,800	XX

XX Not applicable.
1/ Data are rounded to three significant digits, except prices; may not add to totals shown.
2/ Excludes limestone for cement manufacturing.
3/ Less than 1/2 unit.
4/ Excludes precipitated calcium carbonates.

Source: U.S. Bureau of the Census.

FIGURE 1
PRODUCTION OF CRUSHED STONE IN THE UNITED STATES IN 1996, BY GEOGRAPHIC DIVISION



Crystalline Silica

Robert E. Glenn, C.I.H.
for the
Chemical Manufacturers Association
Crystalline Silica Panel

IARC Group 1 - Carcinogen

- Sufficient Evidence of Carcinogenicity
- Causal Relationship Between Exposure and Human Cancer
- Based on All Relevant Information, Including Exposure-Response
- Where Chance, Bias and Confounding Could be Ruled Out

The IARC Finding

- Sufficient Evidence for the Carcinogenicity of Silica from Occupational Sources
- A Divided Vote of the Working Group with a Note that:
  - "carcinogenicity was not detected in all industrial circumstances"
  - "carcinogenicity may be dependent on the inherent characteristics or external factors of the crystalline silica"

"Silica/Lung Cancer Hypothesis"

- Weight-of-the-evidence review of the silica epidemiology in Dr. John Gamble's report
- Twelve silica exposed worker studies identified that met selection criteria
- Eight found no increased risk and no exposure-response
- Three found only a weak association in the highest exposed group (Not significant)
- Only one found a statistically significant increase (Not significant when adjusted for silicosis)

TABLE 3

RESULTS FROM STUDIES OF SILICA-EXPOSED WORKERS REGARDING STRENGTH OF ASSOCIATION AND BIOLOGICAL GRADIENT

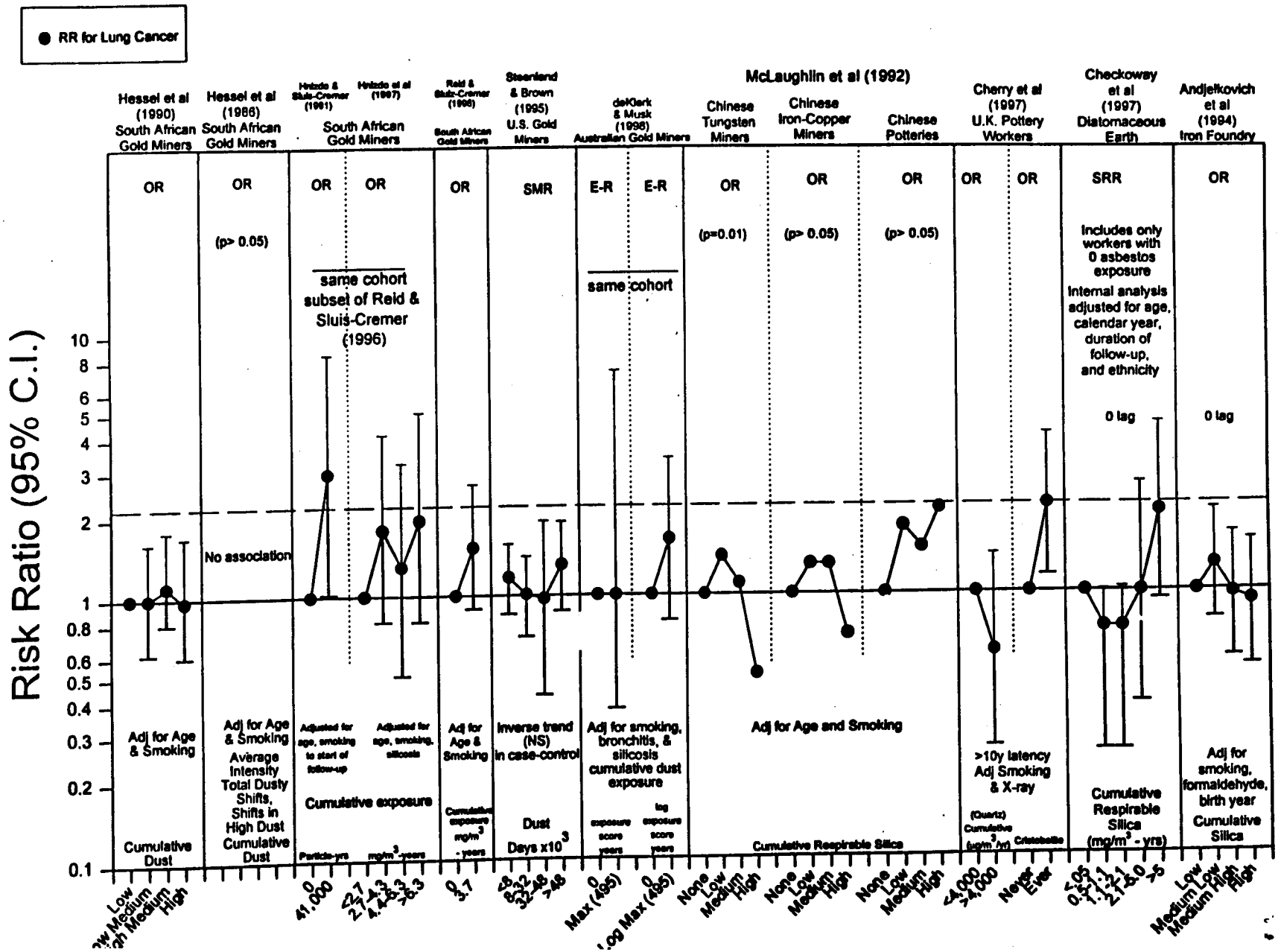
STUDY	STRENGTH OF ASSOCIATION*	BIOLOGICAL GRADIENT (E-R)
Hypothesis: Does exposure to silica increase the risk of lung cancer?		
Gold Miners		
Hessel et al. (1990)	No association	No trend
Hessel et al. (1986)	No association	No trend
Reid and Sluis-Cremer (1996)[+]	Weak association	Marginally nonsignificant trend
Hnizdo and Sluis-Cremer (1991)[++]	2.92-fold increase ($p < 0.01$)	Significant trend ($p < 0.01$)
Hnizdo et al. (1997)	Weak association	Marginally nonsignificant trend
Steenland and Brown (1995)	No association	No trend
de Klerk and Musk (1998)	No association	No trend
Other Miners		
Tungsten		
McLaughlin et al. (1992)	No association	Inverse trend ($p < 0.01$)
Iron-Copper		
McLaughlin et al. (1992)	No association	Inverse trend ($p > 0.05$)
Potteries		
McLaughlin et al.(1992)	Weak association	Nonsignificant trend ($p > 0.05$)
Cherry et al. (1997)	No association	Inverse trend
Iron Foundry Workers		
Andjelkovich et al. (1994)	No association	Inverse trend
Possible Cristobalite Exposure		
U.K. Pottery		
Cherry et al. (1997)	Weak association (significant)	Not evaluated: assessed only ever versus never exposed
Diatomaceous Earth		
Checkoway et al. (1997)		
Regression adjustment for asbestos	Weak association (significant)	Marginally significant trend
Exposed to silica but not asbestos by authors' classification	Weak association	Only elevated RR is in high exposed category

* Weak association = RR about 2 or less in high exposed category; association is not significant unless otherwise noted
No association = RR about 1 in high exposed category; association is not significant unless otherwise noted

[+] Hnizdo and Sluis-Cremer (1991) is a subset of Reid and Sluis-Cremer (1996)

[++] Same lung cancer cases in Hnizdo and Sluis-Cremer (1991) and Hnizdo et al. (1997); >41,000 particle-years to start of follow-up in Hnizdo and Sluis-Cremer (1991)

Figure 1: Exposure-Response: Lung Cancer with Quantitative Estimates of Cumulative Silica Exposure



"Silicosis/Lung Cancer Hypothesis"

- Eleven silicotic studies identified that met selection criteria
- Ten show no statistically significant difference between silicotics and non-silicotics
- Three of four do not show significant differences by severity of silicosis
- None show significant exposure-response trend

TABLE 4

RESULTS FROM STUDIES OF SILICOTICS REGARDING STRENGTH OF ASSOCIATION AND BIOLOGICAL GRADIENT

STUDY	STRENGTH OF ASSOCIATION*	BIOLOGICAL GRADIENT	
		DOSE-RESPONSE** (severity of silicosis)	EXPOSURE-RESPONSE***
Hypothesis: Are silicotics at Increased Risk of Lung Cancer?			
Hessel et al. (1990) (autopsy)	No association	Inverse trend (p = 0.76)	Inverse trend
Hessel et al. (1986) (autopsy)+	Weak association	Nonsignificant trend (p = 0.08)	Inverse trend
Hessel et al. (1986) (radiology)	No association	–	Inverse trend
Hnizdo and Sluis-Cremer (1991) (autopsy)++	No association	–	–
Hnizdo et al. (1997) (radiology)	Weak association	–	–
Cherry et al. (1995) (radiology)	Weak association	–	–
Carta et al. (1991) (radiology)	No association+++	Nonsignificant Inverse trend	Nonsignificant trend
McLaughlin (1992) (radiology)			
Potteries	No association	–	–
Tungsten Mines	No association	–	–
Iron-Copper Mines	3.1-fold increase (p <0.05)	–	–
Dong et al. (1995) (radiology)	2.5-fold increase (nonsignificant)	Increasing trend	–

* Weak association = RR about 2 in silicotics compared to nonsilicotics; association is not statistically significant unless noted otherwise
No association = RR about 1 in silicotics compared to nonsilicotics; association is not statistically significant unless noted otherwise

** Dose-response means assessment of risk by severity of silicosis

*** E-R means assessment of risk among silicotics by silica exposure

\+ Same cases and controls in radiological/autopsy analysis of Hessel et al. (1986)

++ Same lung cancer cases in Hnizdo and Sluis-Cremer (1991) and Hnizdo et al. (1997)

+++ SMR based on comparison of silicotics to expected rates for the regional population

Figure 2: Risk of Lung Cancer: Comparison of Silicotics versus Non-Silicotics: Test of Silicosis/Lung Cancer Hypothesis

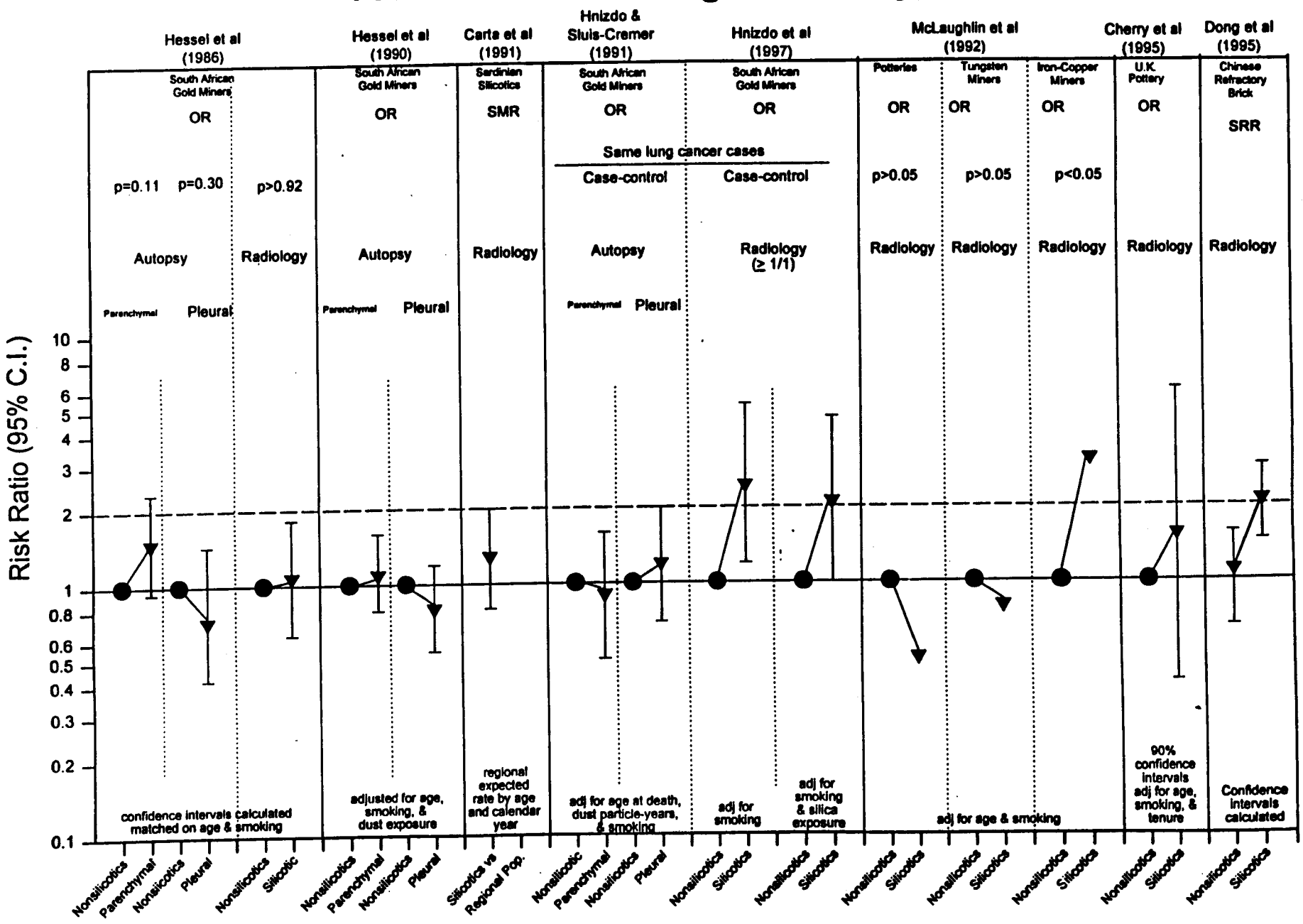
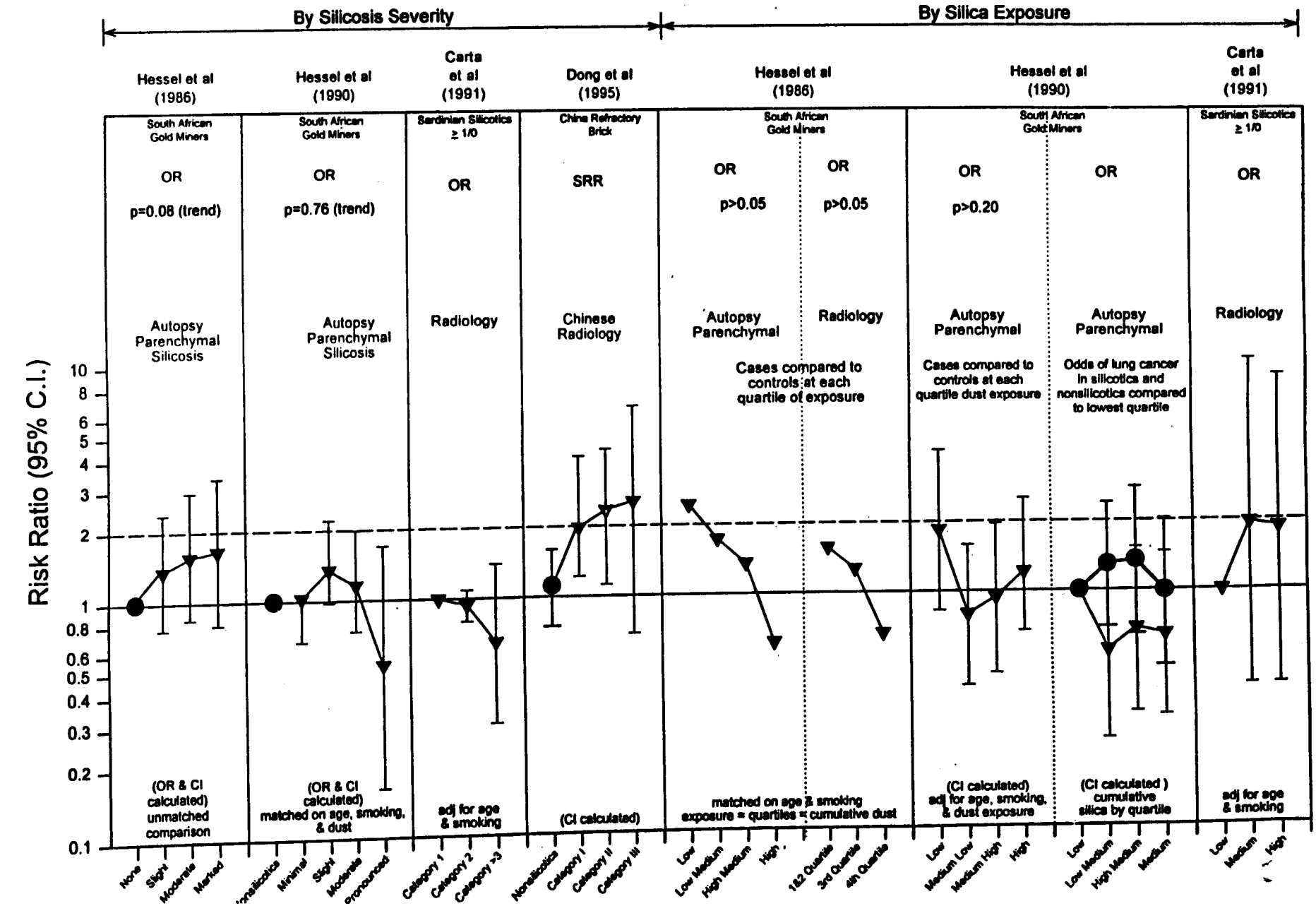


Figure 3: Risk of Lung Cancer Among Silicotics by Severity of Silicosis and by Exposure: Test of Silicosis/Lung Cancer Hypothesis



Silica and Animal Experiments

- Silica exposures by inhalation and intratracheal instillation cause lung cancer in rats
- Exposure-response studies not conducted
- Studies in mice and hamsters are negative
- Other durable particulates in inhalation studies also are tumorigenic in rats
- Rat lung epithelium may be "primed" to respond with increased tumors when treated with particles
- Above observations make animal studies difficult to interpret, and call into question relevance of findings

Durable Particles Carcinogenic in Rats

- QUARTZ
- TALC
- OIL SHALE
- TITANIUM DIOXIDE
- CARBON BLACK
- DIESEL SOOT
- TONER
- COAL DUST

Silica and Lung Cancer
"The Question of Causality"

- Strength of association, where it exist at all, is weak
  - In almost no case is risk statistically significant
  - Studies have adequate statistical power to detect risk
- Exposure-Response relationship is usually absent
  - Sharp contrast to strong E-R relationships for NMRD
- No convincing dose-response relationship with lung cancer where silicosis is a surrogate for dose

Applying the Bradford Hill Criteria

"The weight of evidence does not support a ***causal association*** between silica exposure and lung cancer or between silicosis and lung cancer"